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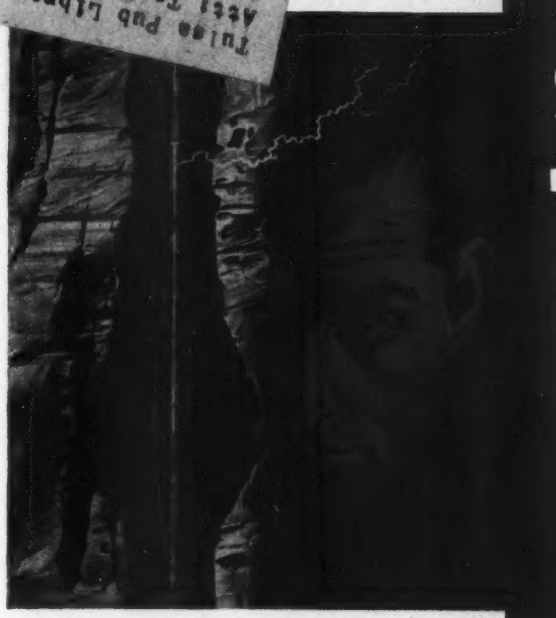

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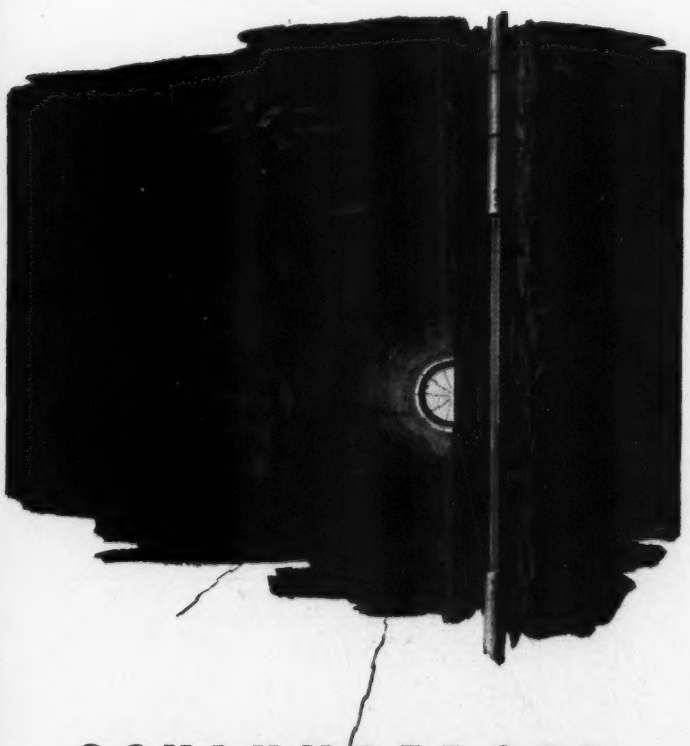

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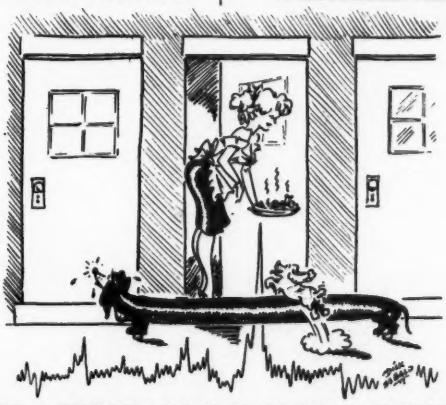

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The Use of Computers in Petroleum-Refining Problems

Jack Sherman
The Texas Co., Houston, Texas

ABSTRACT

In order to produce gasoline, diesel fuel, and other products conforming to given specifications, various unit processes are used, such as distillation, cracking, reforming, alkylation, and polymerization. At the outset it is not evident what schedule of operations should be carried out in a given refinery in order to produce the desired finished products most efficiently. Many alternative possibilities generally exist, and the most desirable one can best be determined by making a large number of calculations. In the past these calculations could not be carried out adequately because they are so extensive that the time involved would have been prohibitive. However, the use of a high-speed computer greatly increases the amount of computation which it is practical to perform. One important advantage of this is that it puts the refinery in a much better position to meet unexpected situations such as equipment breakdown. Another advantage is that it liberates the process engineer from tedious desk computations and so enables him to be more productive.

I. Introduction

In a moderate-size or large petroleum refinery there generally exists some freedom in determining the compositions of the various products and in choosing values of the controllable process variables for a given set of product specifications and given crude avails. Moreover, the product specifications, crude-oil supply, and refinery operations do not remain constant for long. The basic computing problem in petroleum refining is, therefore, a determination of the most suitable operating schedule for a given situation. This usually involves a detailed material balance for the entire refinery. The associated numerical computations are voluminous to such an extent that if they must be performed by means of desk calculators, it becomes entirely impractical to consider more than a very small number of cases. Recently, this type of computation has been performed in The Texas Company on a large-scale electronic digital computer. Before this computer is discussed in more detail, a brief description of computers in general will be given.

II. Computing Machines

Generally speaking, computers can be classified according to two types: analogue and digital. As the name implies, analogue machines compute by measuring continually varying physical quantities. A familiar analogue computer is the slide rule, which performs multiplication of two numbers by adding lengths proportional to the logarithms of the numbers. An electric analogue computer for solving the linear simultaneous equations arising in mass spectrometer analyses is rather widely used in petroleum refineries. Although analogue machines are useful for specialized problems, they are limited in accuracy, and no further discussion will be given here.

A digital computer operates by a discrete counting process. The general-purpose machines commercially available at present range in size from small manually operated desk calculators to large electronic systems capable of performing thousands of numerical operations per second. These electronic computers have other essential characteristics in addition to their high speed of computation. One of these is their ability to make logical decisions, such as an alteration of the sequence of arithmetic steps at some intermediate stage of the problem, dependent upon some intermediate result. Another characteristic is the storage within the machine of all the data and arithmetic instructions at the outset, with subsequent high-speed random access to any item of data or to any instruction. These properties of large electronic computers provide the flexibility needed to handle the trial-and-error type of computation which is characteristic of refinery processing studies.

III. Refinery Processing Studies

The primary obective of carrying out numerical computations relating to processing studies for a given refinery is to determine optimum

values of controllable process variables which will result in producing the finished products in the desired amounts, and in meeting the specifications set up for these products. Under certain conditions, it may turn out that no combination of process variables exists which will be satisfactory. Thus, if a refinery is operating so as to produce motor gasoline and other products and it is desired to increase the octane-number specification of the gasoline by a small amount, it may be possible to do so by changing the schedule of operations. However, as the desired octane-number increase becomes larger and larger, there will be some point at which the refinery will be unable to meet the desired specifications with the equipment at hand. In this case, it will be necessary to introduce an additional process such as catalytic reforming. During the past few years the petroleum industry has been investing many millions of dollars for this purpose.

Consider a refinery operating with given crude avails and producing gasoline and other finished products conforming to given specifications. In general, the specifications determine neither the compositions of the products nor the values of the process variables uniquely. The specifications are frequently maximum or minimum specifications rather than unique values. At the outset the parameters in the refinery system are the values of the process variables, such as feed rates to the various units, operating temperatures, etc., and the compositions of various intermediate streams and of the finished products. From the mathematical standpoint one has a set of simultaneous inequalities involving the process variables and compositions, in terms of the specifications of the finished products. Computationally, it is desired to determine the permissible ranges of the parameters which satisfy the set of simultaneous inequalities. When these computations are carried out by a refinery engineer by means of a desk calculator, a complete mathematical formulation of the problem is omitted. The engineer frequently makes "decisions" during the course of the computations, based upon past experience, in order to arrive at a satisfactory set of process variables and product compositions within a reasonable period of time. However, it is rarely practical, when a desk calculator is used, to explore the complete permissible range of parameters so that a given set of values can be determined within this range which optimizes profit or achieves some other desired condition. Thus the need has been felt for utilizing a high-speed electronic computer having the necessary flexibility and capacity to handle the complete problem.

About two years ago The Texas Company decided to undertake the task of carrying out some refinery processing studies by means of a large electronic computer which was available at that time on an hourly rental basis. The company's Eagle Point Works, at Westville, N. J., was chosen as the refinery for this study because of its intermediate size and its proximity to New York City where the computer was located. The specific problem involved an evaluation of several possible crude oils in order to provide a basis for decision as to what crudes should be made available to this refinery for future processing.

At the outset it was evident that the first problem was that of obtaining a complete mathematical simulation of the Eagle Point Works. This involved converting the numerous graphical correlations to equation form. These correlations are of two general types, one of which relates the pertinent properties (API gravity, 50-per-cent point, viscosity, etc.) of the effluent streams in a given unit process to the properties of the feed and operating variables of the process. The second type of correlation involves the blending of primary and intermediate streams and the relationships between the properties of a blend and those of the components. In both cases these correlations are based upon plant and laboratory data and are specific to each refinery.

In some cases it turns out to be quite difficult to obtain an equation which agrees with a graphical correlation sufficiently well over the complete ranges of the variables. However, in these cases it is usually satisfactory to approximate the entire curve by two or more straight-line segments over smaller intervals, since the electronic computer can be programmed to select the proper interval for a given value of the independent variable and then select the corresponding linear equation with which to compute the dependent variable.

When a suitable mathematical model of the refinery had been obtained, the next problem was to perform the numerical and mathematical analyses of the system. When the equations are nonlinear, as was true in the case in question, no general mathematical method is known for the direct solution of a system of simultaneous equations and inequalities. Trial-and-error procedures are required, and these must be formulated in complete detail. This was followed by a detailed description of the flow of the computations leading to the desired results. The flow involves all the decisions as to the exact sequence in which the computations are to be carried out, the information to be printed, and the like. The next step is to translate the computational flow into a series of instructions which can be introduced into the machine and carried out at electronic speed. This coding invariably contains errors and so must be checked out and corrected in so far as possible before real production can begin. In a complex problem where many alternative paths of computation can occur during the course of the problem, it can become entirely impractical to verify the correctness of every possible flow at the outset. In a case of this kind, the only practical procedure is to start using the program and to eliminate errors as they are discovered in use. When the program has been in use on a large variety of problems, the reliability increases and approaches certainty.

The time required, in this instance, to set up the mathematical model, perform the numerical analysis, and code and check out the computational machine program was approximately eight man-months. Thereafter, a complete material balance

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under a given set of conditions could be obtained in approximately 15 min, as compared with a week or more for the hand calculation.

This difference in time has several important consequences. It liberates the process engineer from tedious desk computations, and so enables him to be more productive, with consequent increase in interest and morale. Moreover, with the present critical shortage of technically trained people available to industry, the use of a high-speed computer is one of the few ways available to a company to increase effectively its technical productivity with is present technical staff.

Another important advantage of using a high-speed computer for processing studies is that it puts the refinery in a much better position to meet unexpected situations where quick action is required, e.g., in the breakdown of a piece of equipment or the sudden necessity to use a different source of crude oil.

The first set of material balances obtained for the Eagle Point Works of The Texas Company seemed to be at variance with what the process engineer expected intuitively. However, a detailed study of the results showed them to be correct, and that intuition was not reliable in qualitatively predicting the effect of numerous variables changing simultaneously. The results suggested a new series of balances to be computed, the results of which proved to be informative. Thus, by alternately computing and studying the results, the engineer was able to increase his knowledge of the operating characteristics of the refinery in a matter of days—information which could not have been obtained in several months of hand computation. This is perhaps the most important consequence of electronic machine computing.

In addition to facilitating the study of the operation of an existing refinery, the same kind of computations have been made in determining the feasibility of making new products, as well as the economic advantage of introducing additional equipment into a refinery and of building new refineries. Even more broadly, it becomes practical for a company such as The Texas Company, which operates several refineries, to consider its simultaneous operation with respect to optimum crude-oil allocation and optimum overall operation. The computations can be extended to include considerations of distribution costs of crude oils and finished products, of production costs of crude oils, of statistical analysis of sales to forecast demand, and the like. There is no doubt that the ultimate result of using high-speed electronic computers to attack this general problem will be to achieve a significant increase in refinery operating efficiency.

Presented to a session on computers during the 21st Midyear Meeting of the American Petroleum Institute's Division of Refining, in the Sheraton-Mount Royal Hotel, Montreal, Que., Canada, May 15, 1956; presiding A. G. Farquharson, McColl-Frontenac Oil Co., Ltd., Montreal, Que., Canada.

Review Of The Smoke And Fumes Committee Research Program

L. C. Kemp, Jr.
The Texas Co., New York, N. Y.

ABSTRACT

The Smoke and Fumes Committee's program of fundamental research on air pollution, as related to the transportation, refining, and use of petroleum and its products, is nearing the end of its third full year of operation. During this period almost three quarters of a million dollars has been spent on 10 research projects. Of these projects, two were completed prior to 1956 and four are being completed this year. Four new projects are being started. Close liaison is maintained with other groups working on the problem, and every effort is made to avoid duplication of the work of others and to obtain useful information from the Smoke and Fumes Committee's research projects. The projects have already made substantial contributions through the development of improved analytical devices and methods, through provision of more reliable information on the sources of pollutants, and through the development of new and important information on the reactions of pollutants in the atmosphere. Much valuable information should come from the work to be done in the future.

The research program of the Smoke and Fumes Committee of the API Division of Refining was established in the belief that there was an acute need for fundamental information on the sources and effects of atmospheric pollution resulting from the transportation, refining, and use of petroleum and petroleum products. Although one is naturally inclined to think first of air pollution in terms of the Los Angeles "smog," problem, it has been and is still the conviction of the industry that this is an issue of vital importance.

The research program is now nearing the end of its third full year of operation. During these three years, work has been done on 10 projects by carefully selected university and research-institution teams. Total expenditures to date are close to three quarters of a million dollars. It should be pointed out that this sum does not include the costs incurred by the individual petroleum companies in connection with the service of highly competent technical personnel on the Technical Advisory Committee and the project advisory committees in guiding the program.

It is believed that this three-year mark offers an appropriate occasion to review the work and accomplishments to date and to state the directions to be taken in the future. This paper will, in substance, be a

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review and extension of the progress report presented by Mr. Vance Jenkins at the 19th Midyear Meeting of the Division of Refining, in Houston, May 1954.

The research program in effect at the time of the last midyear meeting was described in a handout entitled "The Smoke and Fumes Committee and Its Research Program." It may be recalled that 10 projects were described in this paper; two of them had been completed, and eight were active. Soon after the May 1955 meeting, the three projects located at The Franklin Institute in Philadelphia were combined into one project. Now, a year later, four more of the original research projects are terminating at the close of the current contract year, and negotiations are under way to activate four new projects.

The direction of the program is being changed as the results from research become available to clarify the technical aspects of air pollution. The executive secretary maintains close liaison with other agencies active in this field; e.g., the Air Pollution Foundation, by membership on its Technical Advisory Committee; the American Society of Mechanical Engineers, by membership on its Committee on Air Pollution Controls; the Group on Composition of Exhaust Gases of the Coordinating Fuel and Equipment Research Committee (CFR), through active participation in its group and panel meetings; and the Western Oil and Gas Association.

Completed Research

The first research project to be completed under the Smoke and Fumes Committee's research program related to the determination of the amount of hydrocarbons and partially burned hydrocarbons present in the flue gases from several types of domestic and industrial burners and furnaces using petroleum products. This project, at the Armour Research Foundation in Chicago, comprised a field survey of 74 installations. These installations varied from domestic hot-water heaters to industrial furnaces with fuels ranging from natural gas to No. 6 fuel oil. In some instances there was considerable maladjustment of the burner involved. In all cases, less than 100 ppm of hydrocarbon or derivatives was present in the flue gas. In almost all cases there was less than 50 ppm, and in most of the cases there was no detectable amount of hydrocarbon. One must conclude that the contribution of stationary combustion processes using petroleum products to the organic material emitted to the atmosphere is not serious. These data indicate that this source of pollution is far less than one per cent of the total organic material put into the atmosphere in a modern American city.

In another project now completed, and carried out at the Kettering Laboratory at the University of Cincinnati, a survey of the so-called oxidant (expressed as ozone) and oxidant-precursor content in several American cities was conducted. It might be well to review briefly at this point the basis for the interest in the oxidant and oxidant precursors. One of the unusual effects associated with the Los Angeles smog is the presence in the air during daylight hours of unusually high concentrations of an oxidizing material which behaves chemically like ozone. From the evidence available to date it seems probable that a good share of this oxidant is actually ozone, although it is fairly certain that other more complicated oxidants are also present. The oxidants including ozone are believed to be produced by the action of the sun's rays on certain pollutants in the air. These substances from which the oxidant is produced by the action of the sun are grouped under the broad term of "oxidant precursors." Their presence is measured by subjecting a sample of night air to artificial radiation.

Oxidant was recorded in cities which fall into four classifications: those with heavy automobile traffic and minimum industry, like Washington, D. C.; those with oil refining plus general heavy industry, like Philadelphia, Pa.; those with general heavy industry but with a minimum of oil refining, like Akron, Ohio; and those having a heavy concentration of chemical industry, like Charleston, W. Va. In all of the cities surveyed, the oxidant recorded was in the low range typical of Los Angeles under non-smog conditions.

Measurements of the SO_2 concentration, made at the same time, brought out the interesting fact that all of the cities investigated usually had much more sulfur dioxide in their atmosphere than does Los Angeles. In fact, it was found that as the sulfur dioxide increased, the oxidant decreased. A more detailed study made at Washington, D. C., and in Cincinnati, under conditions when little sulfur dioxide was found, showed higher oxidant values than when the SO_2 concentration was higher. This relation held for oxidant precursors as well. In Washington, D. C., when SO_2 concentration was of the same order as it is in Los Angeles, the ozone and oxidant-precursor values were approximately one tenth of those observed in Los Angeles on mildly smoggy days.

The full significance of this relationship between oxidant and sulfur dioxide is far from clear. It is certainly indicated, however, that elimination of SO_2 emissions to the air does not result in lower oxidant formation, and may actually permit the oxidant concentration to reach higher levels than would be the case if sulfur dioxide were present in larger amounts. Some further observations in this connection are presented later in this paper in relation to another project.

Projects Now Being Terminated

For three years the largest project in the Smoke and Fumes Committee's program was carried out at Stanford Research Institute's laboratories in Pasadena, Calif. In this work studies have been made on the mechanism by which ozone and other oxidants are formed in the atmosphere and on the development of methods for determining the oxidant-forming potential of polluted atmospheres. The work at Stanford Research Institute, supported by the American Petroleum Institute and others, has contributed a large amount of significant knowledge in the field of air-pollution chemistry. For example, the method of measuring oxidant with potassium-iodide recorders was developed at Stanford Research Institute, as was the

method of determining oxidant-precursor values. The latter development resulted from the observation made at Stanford Research Institute that if night air collected when the atmospheric conditions were such that smog was likely to be produced the next day was irradiated by ultra-violet light just below the visible range of wave length, high concentrations of oxidant would form. In other words there were materials in the atmosphere which, although they did not possess oxidant properties, would form oxidant upon irradiation with natural or artificial light.

Work carried out later indicated that the presence of nitrogen dioxide in the atmosphere was a key to this photochemical reaction. The available information gives strong support to the following postulation of the course of the reaction. The nitrogen dioxide absorbs light to form nitric oxide (NO) and an atom of oxygen. The latter combines with molecular oxygen to form ozone. Because it is known that nitric oxide is oxidized rapidly to nitrogen dioxide by ozone, the mechanism of oxidant formation must involve the removal of nitric oxide by some other means. The oxidant-forming tendencies of many organic materials have been investigated by Stanford Research Institute and other laboratories and great differences have been found to exist. The mechanism of the reaction which occurs after the primary photochemical process involving the nitrogen dioxide is very complicated and has not yet been unraveled. Some reaction products have been identified by others and it is believed that the mechanism will soon be clarified.

The Stanford Research Institute project has just been completed, and our thanks to them, for contributing so much knowledge of the chemistry of the air, are in order.

A project at the Industrial Hygiene Foundation of America is just being terminated. In this case a method was developed for tracing the path of gases after emission from a stack to any point downwind. After a laboratory investigation of several methods found suitable, a full-scale test on the most promising method was carried out. This method involves the suspension of finely divided antimony oxide in the stack gases and the collection of samples at various downwind locations on a sampler developed at the Industrial Hygiene Foundation of America. These samples are analyzed for antimony by irradiating them in the Oak Ridge reactor and determining the antimony content by a counting technique. These results have been assembled, and a final report is in preparation. The Project Advisory Committee is contemplating the preparation of a method for use by industry for tracing gas streams. This should provide a useful tool for the petroleum industry and others active in air-pollution control.

Another project at the Armour Research Foundation is just being concluded. This one is on the development of a quantitative method for analyzing ozone in the atmosphere, which is specific to ozone as distinguished from other oxidants, and which can be made relatively portable. The method involves, in substance, a measurement of the heat released when the ozone is catalytically decomposed to molecular oxygen. The catalyst employed is highly selective to ozone decomposition under the conditions used, and the heat released is measured by determining the temperature rise in the sample resulting from the decomposition. Highly sensitive elements called thermistors are used for this purpose. It is planned to field-test the instrument in the Los Angeles area at a time when the ozone concentrations are in the higher regions typical of smog conditions. This will permit comparison with other methods of ozone analysis now being used. If these tests indicate that the instrument has been satisfactorily developed, it will be made available to anyone interested in its use in other studies and operations in which accurate ozone determinations are important.

Another research project which will close at the end of June this year is one being carried out at the University of Illinois under the direction of Prof. H. F. Johnstone. Professor Johnstone and his coworkers have studied the oxidation of sulfur dioxide to sulfur trioxide under conditions which may exist in the atmosphere. They have found that the oxidation is very slow and that formation of sulfur trioxide from gaseous sulfur dioxide cannot account for the reduction of visibility observed in atmospheres during a few hours of daylight, nor can it account for the high sulfate content of particulate matter found in some cities.

The atmospheres of many American cities contain much sulfur dioxide. This sulfur dioxide at high concentrations over about 1 ppm can cause damage to sensitive plants. Below this threshold value, sulfur dioxide in the atmosphere is innocuous. Here again is evidence which seems to indicate clearly that elimination of SO_2 emissions beyond that required to get below the threshold value will have little, if any, effect in reducing the undesirable results of atmospheric pollution. In fact, such elimination may result in an increase in the undesirable manifestations.

Projects Being Continued

Another project at the University of Illinois is being continued. The primary objective is to study the rate at which visibility may be reduced or other manifestations of polluted atmospheres may appear as a result of the reaction hydrocarbon and ozone in the presence or absence of other materials. This project has been activated within the past several months. No results are yet available to report, but the vigor with which Professor Johnstone is approaching the problem portends that interesting information will soon become available.

The last of the older projects which will be continued, and with increased emphasis, is the project at The Franklin Institute. This project, under the technical direction of William E. Scott, has made many significant contributions. The development at The Franklin Institute of the long-path infrared cell for studying atmospheric reactions has led to a great deal of new knowledge about these reactions. This

work has been recognized throughout the country as an outstanding piece of research. The United States Public Health Service is giving consideration to having one of these instruments made for research on atmospheric pollution. The first results of The Franklin Institute work with the long-path cell were presented at Minneapolis last September at a symposium of the American Chemical Society. The paper was extremely well received, and The Franklin Institute has been invited many times to give the paper to other groups. The latest findings by this group are reported by Mr Scott,* and I am sure that you will be impressed by the excellence of the work and the significance of the results obtained.

New Research Program

The new research program of the Smoke and Fumes Committee, which began officially on July 1, 1956, includes four new projects. The largest of these involves the construction of another long-path infrared cell by The Franklin Institute for studies of the concentrations of materials in the atmosphere, and for extending the mechanism studies being carried out in the Franklin laboratory in connection with the institute's current project. This new cell will be semiportable, and will be located first in Pasadena where studies with it can be integrated with those of the Air Pollution Foundation. Measurements on the atmosphere are also being made by the Los Angeles County Air Pollution Control District and Professor Haagen-Smit at that location.

It is believed that the simultaneous determination of materials by the highly sensitive infrared techniques developed by The Franklin Institute will be extremely valuable in determining what is going on in the air. The cell will, of course, be capable of studying reaction mechanisms with purified air as well as air taken from the polluted atmosphere that may exist during a smoggy season. Making the cell portable will allow these measurements to be made at other locations. Because the method gives unequivocal determination of ozone and some other materials, it is possible that this instrument or some suitable modification will be of interest for atmospheric monitoring purposes. The American Petroleum Institute instrument will be operated by personnel of the Franklin Institute. Construction of the instrument has already been started, and it will be put into operation as soon as possible.

Although much additional information on the matter must be obtained, it is already known that a substantial amount of the hydrocarbons in the air come from internal-combustion-engine exhausts. The automotive industry is working diligently on methods of eliminating, or at least drastically reducing, this source of hydrocarbon emissions. As a part of this general activity the CFR Group on Composition of Exhaust Gases, which is currently carrying out a survey of the amount of organic material, nitrogen dioxide, nitric oxide, and carbon monoxide emitted by automobiles under actual city-driving conditions, is sponsoring a research project at the Bureau of Mines in Bartlesville, Okla. An analytical technique, which employs the principles of gas chromatography is being applied for detailed analyses of exhaust gases. This CFR project derives half its support from the American Petroleum Institute through the Smoke and Fumes Committee. The other half of the support comes from the Automobile Manufacturers Association. Development of this method of analysis will allow much more detailed studies of exhaust-gas composition than have been possible to date.

As has been brought out in the foregoing paragraphs, the Smoke and Fumes Committee research carried out at The Franklin Institute and Stanford Research Institute, and the research carried out by other sponsors, has led to the identification of reaction products which may be responsible for some of the manifestations of polluted atmospheres. It is known that the typical damage to plants which occurs in industrial areas is not caused by sulfur dioxide, ozone, hydrocarbons, formaldehyde, or oxides of nitrogen. The effects of the new reaction products recently identified have not been determined, and a new project at the University of California, at Riverside — where John Middleton, an outstanding plant pathologist in the field of air pollution, will test these materials —is therefore being activated. This project, integrated with the one at the University of Illinois and some Air Pollution Foundation projects relating to eye irritation, should provide valuable information concerning the reaction products which are the real culprits in the atmosphere.

Finally, a project is being started on a study of all the possible methods which might be used to isolate and identify all the constituents present in a polluted atmosphere. Although the usual analyses for ozone, oxidant, sulfur dioxide, particulate matter, and nitrogen oxides have been made many times, a complete analysis for the organic constituents has not yet been made. Indications have been obtained from analyses of condensed samples, but the analyses have been incomplete or made by methods open to question.

Two outstanding men in the country, capable of evaluating methods of analyses, are studying the possible techniques. These techniques range from gas chromatography to wet-chemical analysis; use of infrared or ultraviolet procedures; and methods such as condensation of samples from gigantic masses of air, followed by fractional distillation, mass spectrometry, and infrared analyses. Work of all the other investigators is to be reviewed as part of the study. It is believed that the availability of complete and reliable methods of analysis of the atmosphere for other than the usual constituents is necessary to determine causes and cures of air pollution.

Every effort is being made to integrate the Smoke and Fumes Committee's research program with all the other work going on in this country. This in itself is no small task. The Air Pollution Foundation has an annual research budget of from one--half to one million dollars. The United States Public Health Service can spend up to five million dol-

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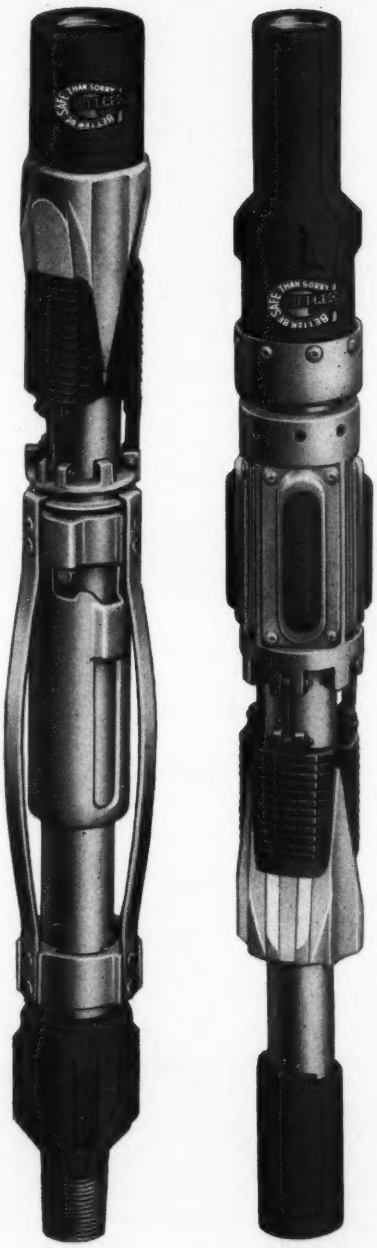

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TYPE AF

You get three important savings when you support pump and tubing with a Guiberson Tubing Anchor — *save wear* on tubing, on collars and threads, on casing. When string is anchored, you'll have fewer leaks and the pumping operation will yield more fluid with less power. Guiberson gives you two types to choose from.

TYPE AF is a tension tool equipped with friction pads and automatic latch. It holds when tension is applied to string. A safety joint is incorporated in the bottom connection that lets you break loose if junk fouls the latch mechanism.

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lars yearly on research. Many states, counties, and cities are carrying out work which totals a large sum. Much of this work is of the monitoring type and is not true research on the fundamentals, but the results of this monitoring are of great value in determining causes and cures.

As stated in the opening remarks in this paper, the petroleum industry is aware of its responsibility as a member of the many communities of this country. It is supporting the Smoke and Fumes Committee program which costs approximately one-quarter million dollars yearly. The Smoke and Fumes Committee and its Technical Advisory Committee feel strongly the responsibility of seeing that these funds are spent wisely. It is believed that the program to date has produced substantial results. It is to be expected that, with the very fine cooperation and active interest in the projects shown by the project workers and by the many able representatives from industry on the various committees, even greater progress will be noted in the future.

* In "Recent Developments in the Study of the Organic Chemistry of the Atmosphere," also presented to this session.

Presented to a session on smoke and fumes during the 21st Midyear Meeting of the American Petroleum Institute's Division of Refining, in the Sheraton-Mount Royal Hotel, Montreal, Que., Canada, May 16, 1956; presiding, John W. Newton, Magnolia Petroleum Co., Beaumont, Texas.

San Ardo Now a Willing Oil Field

San Ardo, once known as the "reluctant oil field," sent its 50,000,000th barrel of oil through General Petroleum Corporation's pipeline on July 17. The first barrel flowed June 19, 1951.

San Ardo is now a willing oil field, but it had to be persuaded. It produces a peculiar kind of crude oil—it won't flow. Discovered in 1947, the field stood virtually idle for about four years for lack of an outlet and because no one could find a way to move the crude to refineries at a worthwhile profit.

The tough problem, getting the oil to flow, was solved by pumping light cutter stock into San Ardo through smaller, parallel line. This thinned the heavy crude with the aid of heat. The cutter is recovered at the refinery and used over and over.

Most of the cutter now is mixed with the crude down-hole in the wells. This not only allows the crude to flow but it also enables the wells to be pumped with less lead line pressure, smaller loads on rods and pumping equipment, requires less heat on the surface to move the oil and permits better pumping efficiency.

As for a pipeline to get the oil from the field, someone came up with another idea. Why not move General Petroleum's idle Lebec-to-Mojave pipeline to San Ardo and use it to bring the sticky crude to the coast, where tankers could take it to the refineries?

Thus, the old pipeline, which had carried more than 132,000,000 barrels of petroleum in its 38 years of desert service, experienced a rebirth.

General Petroleum now has 323 wells in San Ardo producing about 16,000 barrels a day. Since the first of the year 40 wells have been drilled there by GP.

The line from San Ardo to Estero Bay is approximately 40 miles long.

Courses Announced by University of Calif.

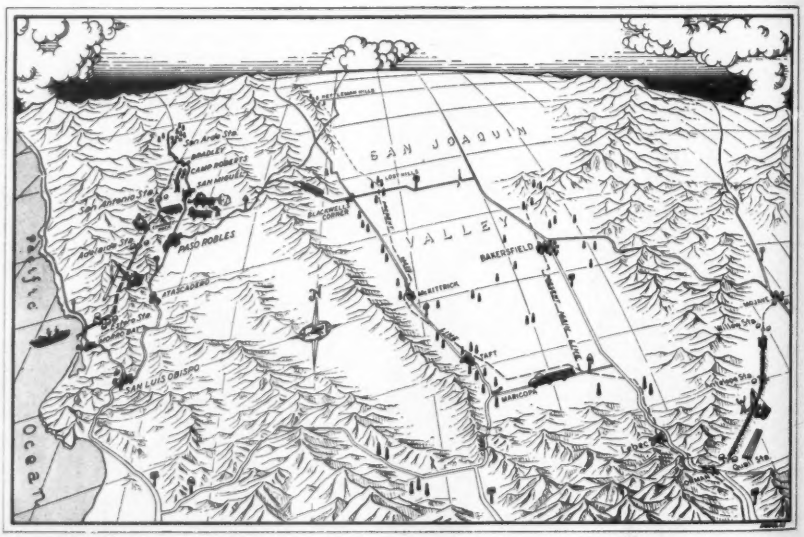
Courses of interest to petroleum industry personnel are planned this fall by University of California Extension.

Max J. Taves, Production Engineer with Richfield Oil Corporation, will lecture on Petroleum Drilling and Production Methods for a course starting Wednesday, September 12, at 7 p.m. at the Extension Center, 813 South Hill Street. It will be a basic course covering the fundamentals of petroleum engineering and drilling and production practice. Paul W. Morgal, Project Engineer with Union Oil Company, conducts a Center course in Petroleum Refinery Equipment and Processes starting September 10, while at U.C.L.A. Harold H. Sullwold, Jr., of the U.C.L.A. faculty lectures on Petroleum Geology during 18 consecutive Wednesday, 7 to 9:30 p.m., sessions in room 3657 of the campus Geology Building starting September 12.

Bulletins listing these and more than 100 other fall engineering courses are available without charge on request to University of California Extension, Los Angeles 24, California.

"An' why," asked the neighbor, "did you call you' last child Encore?"

"Cause he wasn't on de program a'tall," replied the proud father.



The dotted line in the upper left hand corner, from San Ardo to Estero, is the General Petroleum pipeline which carried the 50,000,000th barrel of oil out of the San Ardo field on July 19. The line on the lower right hand corner of the map was the pipeline's route before it was moved to San Ardo in 1951. In its 38 years in desert service, pipeline carried more than 132,000,000 barrels of petroleum.

GENERAL PETROLEUM MAP

JOHN L. COLLYER — *Portrait by Fabian Bachrach*

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"B. F. Goodrich people are proud of their many years of participation in the Payroll Savings Plan. 75% of our employees are members of the Plan, with payroll deductions of $9,000,000 a year.

"Thrift is one of the keys to our continued prosperity. It builds security for the family, retards inflation and stabilizes the purchasing power of the dollar. I am proud that Ohio is a leader in this worthwhile endeavor and that it has been my privilege to serve since 1950 as State Chairman of the Payroll Savings Advisory Committee."

JOHN L. COLLYER, ***Chairman***
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A simple person-to-person canvass that puts a Payroll Savings Application Blank in the hands of *every* employee is all you have to do to install the Payroll Savings Plan or build employee participation in your present plan. Your State Sales Director is ready to help you. Write today to Savings Bond Division, U. S. Treasury Department, Washington 25, D. C.

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CALIFORNIA OIL WORLD

Personalities IN THE NEWS

C.N.G.A. Elects New Officers For 1956-957

The California National Gasoline Association installed the officers elected for the fiscal year of 1956-1957 at its annual Board of Directors' Meeting held recently in the dining room of the Southern California Gas Company.

Raymond W. Todd

Raymond W. Todd, Vice-President of Pacific Lighting Gas Supply Company and recipient of the C.N.G.A. Annual Award in 1954, took over the responsibilities of the Presidency. E. W. Walker, Western Gulf Oil Company, was elected to the Vice-Presidency and E. R. Millett, Jr., was reappointed Secretary-Treasurer.

Directors elected for a two year term were: Paul Armstrong, Union Steam Pump Sales; M. L. Arnold, Richfield Oil Corporation; F. W. Borden, Sunray Mid-Continent Oil Company; P. E. Beckman, Pacific Gas & Electric Company; R. O. Boykin, Monterey Oil Company; A. H. Bradford, West Coast Refining Company; F. E. Bradley, Chanslor-Western Oil & Development Company; C. L. Case, Continental Oil Company; L. V. Cassaday, Lomita Gasoline Company; W. F. Crane, Getty Oil Company; J. T. Doyle, Shell Oil Company; H. L. Eggleston, Analyst; P. E. Foote, Petrolane, Ltd.; Fred L. Hartley, Union Oil Company of California; C. B. Heartwell, Standard Oil Company of California; C. L. Hutchings, Tidewater Oil Company; M. W. Kibre, General Petroleum Corporation; C. B. Kimberlin, Seaboard Oil Company; Wm. A. Kirk, Jr., Pacific Coast Gasoline Company; R. E. Loeck, California Research Corporation; H. J. Maxwell, Standard Oil Company of California; Geo. C. McLaren, Retired; N. H. Mull, The Texas Company; H. W. Parmelee, Consultant; H. M. Paulsen, Bankline Oil Company; L. C. Rowson, The Texas Company; George Sowards, The Ohio Oil Company; H. D. Spiers, The Superior Oil Company; J. B. Taylor, Signal Oil & Gas Company, and R. S. Tulin, Retired.

Committee chairmen appointed included: E. W. Walker, Advisory; M. W. Kibre, Award; Ray Babb, Entertainment; J. B. Taylor, Fall Meeting; K. C. Vaughan, Finance & Budget; Wm. R. Johnson, Membership; H. D. Spiers, Program; Harvey Menard, Technical and J. T. Doyle, Technical Advisory.

E. W. Walker

Nelson Made Tidewater's Avon Refinery Personnel Chief

Arnold Nelson of Walnut Creek, Calif., has been promoted to employee relations supervisor at Tidewater Oil Company's 1,500-man Avon Flying A Refinery, Oscar Larson, refinery manager, announced.

Arnold Nelson

Formerly assistant to the oil company's employee relations supervisor for its 4,500-man western area with headquarters in San Francisco, Nelson replaces Louis L. Kissinger of Concord, Calif., recently deceased.

He will be responsible to Larson, the company explained, for personnel management, labor relations, employee training, plant guard service, safety, and fire protection.

Following graduation with a B.A. degree in economics and business from the University of Washington at Seattle, Nelson started work for Tidewater as an office boy and mail clerk in its San Francisco offices in 1939. Prior to and after World War

II service in the army in Europe in the 78th Infantry Division as a captain, he worked at the Avon refinery here for 8 years in accounting work before being moved over to personnel work in 1952. In 1955, he became divisioinal supervisor of employee welfare plans in the company's western headquarters in San Francisco and moved up to assistant to the western employee relations supervisor there early this year.

Nelson is married and the father of two children.

BJ Service Management Holds Meeting at Long Beach

The management of BJ Service, Inc., recently held a combined sales and operations meeting at the Long Beach, California general office.

Featured at the meeting was the formulation of plans for the continuing expansion of BJ Service, Inc. into new areas, as well as the introduction of new services in areas already served by the company. Also, plans were developed with regard to the new equipment the company is producing.

Participating in the meeting were: John B. Merritt, executive vice-president; W. T. Box, vice-president in charge of operations; M. B. Riordan, vice-president in charge of engineering and development; O. N. Andrew, sales manager; C. F. McMahan, assistant sales manager; J. T. Streger, Pacific Coast division manager; C. R. Cross, Permian Basin division manager; J. L. Buster, Rocky Mountain division manager; Jack Smith, export representative representative and R. E. Wilkinson, executive assistant.

J. D. (Dave) Sterling of Los Angeles, Sunset Oil Company president, is scheduled to become president of Sunset International Petroleum Corporation as a sequel to the expected forthcoming merger of Sunset and International Mining Corporation. Officers of International Mining have called a special stockholders meeting August 20 for the intention of final approval of the merger proposal which recently was given the green light by its directors.

BJ Service, Inc. personnel are shown at the company's Long Beach general office where they recently met for a combined sales and operations meeting.
Front row, left to right: R. E. Wilkinson, executive assistant; John B. Merritt, executive vice-president; J. T. Streger, Pacific Coast division manager and C. R. Cross, Texas division manager.
Back row, left to right: Jack Smith, export representative; O. N. Andrew, sales manager; C. F. McMahan, assistant sales manager; W. T. Box, vice-president in charge of operations; M. B. Riordan, vice-president in charge of engineering and development, and J. L. Buster, Rocky Mountain division manager.

Orrell Named Chief Mechanical Engineer at Shell

John E. Orrell has been named chief mechanical engineer for Shell Oil Company's Pacific Coast area, B. P. Eastin, Shell's West Coast production manager, has announced. Orrell replaces J. E. Gallagher, who has been assigned to Shell's head office in New York City.

John E. Orrell

Orrell started his oil industry career in Shell's Tulsa office in 1935 and has held a number of positions in the company's engineering departments. He served as division engineer at Wichita Falls, Texas, from 1942 to 1946; chief mechanical engineer at the Tulsa office from 1946 to 1950; senior mechanical engineer of Shell's Houston regional division from 1950 to 1951 and chief mechanical engineer of the New Orleans area from 1951 through 1955. His most recent assignment was at The Hague, Netherlands, and in the company's New York office.

A graduate of Rensselaer Polytechnic Institute, Troy, New York, Orrell is married to the former Kathryn Johnson of Butler, Pennsylvania. They have four children: John, 18; Cathryn, 16; Roberta, 14; and Nancy, 8.

Long active in oil industry affairs, Orrell is presently serving as a member of the Central Committee of the American Petroleum Institute and as national chairman of the Institute's committee on the standardization of

oil field belting. He is also national vice chairman of the API production equipment committee.

Beanstalk Productions, a new oil firm at 110 West Ocean boulevard in Long Beach, includes as principals Jack E. Beans, Edward W. Gibb and G. C. Lilenquist.

Kilgore Completes 30 Years With Halliburton

Grover Kilgore, vice president for sales and advertising with Halliburton Oil Well Cementing Company, recently received an award for his 30 years with the company. A watch was given to him in recognition for his long service.

Kilgore was presented the award at company headquarters in Duncan, Oklahoma, by Logan D. Campbell, vice chairman, and his accomplishments were praised by President L. B. Meaders.

He joined Halliburton in 1926 at Duncan as a cementing truck driver and has worked in various capacities around field operations in Oklahoma and Texas. He returned to Duncan in 1947 as sales manager, and was later advanced to his present post of vice president.

"Bud," as Kilgore is known by his associates, studied geology at the University of Oklahoma, where he was also an outstanding athlete.

B. F. Hake, formerly special assistant to the vice president of Western Gulf Oil Company, has been appointed general manager of Bolivian Gulf. A resident of Los Angeles, Hake graduated from Stanford University in 1920 and has some 22 years of service with Gulf. He will be in charge of operations associated with exploration rights which Bolivian Gulf has acquired on more than 7,750,000 acres in Bolivia. Gulf owns 87 per cent of Bolivian Gulf's stock.

Fred Blair Townsend of Phoenix, leading Arizona attorney and a leader in most every walk of life, is given justifiable credit for the sustained oil exploration campaign in his state. He first became interested in the oil and gas production possibilities of Arizona almost 20 years ago and has been the "spark plug" in this direction ever since.

W. R. Sidenfaden, Suburban Gas Service, Inc., Upland, has been named a chairman of a committee of the Liquefied Petroleum Gas Association for the 1956-57 term, which will engage in major study and planning for the LPGA. A total of 22 gas men were named to key posts, with a slate of committee members to be appointed later.

30 years of service—Grover Kilgore, right, is congratulated by Logan Campbell, vice chairman of Halliburton Oil Well Cementing Company, upon the completion of 30 years with the company. Kilgore is vice president in charge of sales and advertising.

Evans Elected Secretary of Lane-Wells

John J. Neale, president, Lane-Wells Company, has announced that Thomas H. Evans, who has been serving as controller, has been elected secretary of the company and made administrative assistant to the president.

Thomas H. Evans

Evans is widely known throughout the oil industry. He attended the University of Tulsa and the Oklahoma School of Accounting and for nine years was controller of the world wide electronics manufacturer, Seismograph Service Corporation. Previously he was on the controller's staff at Douglas Aircraft. Since 1954 he has been assistant controller of Dresser Industries, Inc., headquartered in Dallas.

He is a member of the Controller's Institute of America, National Association of Cost Accountants, and the American Petroleum Institute.

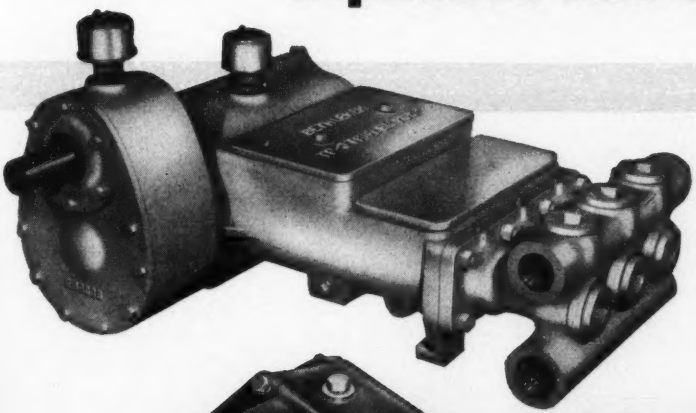
The Evanses with their six children will move to Fullerton, California, where they will reside at 1125 Woodcrest Ave.

G. W. Crossman Appointed Accountant for Byron Jackson Pumps

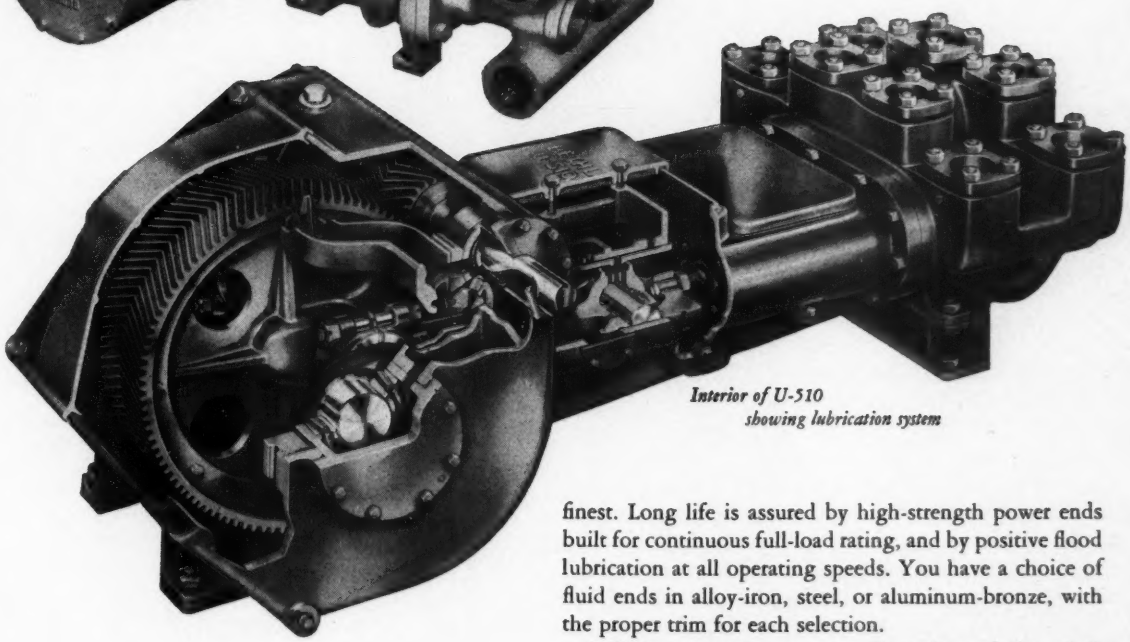
G. W. Crossman has been appointed accountant for Byron Jackson Pumps, Inc., a subsidiary of Borg-Warner Corporation, it is announced by Robert Harcus, executive vice-president. In his new duties, Mr. Crossman is responsible for all accounting and fiscal matters for pump products.

George Crossman has been with Byron Jackson for sixteen years.

Pick your "Handy Man" from this expanded line of power pumps



TP-3 Triplex Pump



Interior of U-510 showing lubrication system

Bethlehem now offers five distinct sizes of general-service pumps, so that it's even easier to pick just the right unit. We doubt that you've ever seen a line of pumps with so much versatility. Each is a "handy man"—a pump that can readily be adapted for several different kinds of work.

Does your job involve waterflooding? Salt-water disposal? Pumping crude oil in gathering systems or pipe-line service? Pumping mud or water for the drilling rig? If the answer is yes, there are Bethlehem units that will fit perfectly into your engineering plans.

You can bank completely on the quality of these pumps. Components are exhaustively tested. Materials are the finest. Long life is assured by high-strength power ends built for continuous full-load rating, and by positive flood lubrication at all operating speeds. You have a choice of fluid ends in alloy-iron, steel, or aluminum-bronze, with the proper trim for each selection.

Bethlehem pumps are so well engineered that their salvage value is always high. We feel certain that their many advanced features will interest you. If you will write or call, our people will gladly furnish complete information.

FIVE SIZES, DUPLEX AND TRIPLEX

Model	Type	Plunger Load, lb	Input Hp	Bore & Stroke, in.
U-33	Duplex	2400	14 @ 180 rpm	1¾ to 3 x 3
UA-46	Duplex	5000	40 @ 120 "	2½ to 4 x 6
U-510	Duplex	12000	100 @ 75 "	3 to 5½ x 10
TP-3	Triplex	3580	22.4 @ 250 "	1¾ to 2¼ x 3
TP-4	Triplex	5000	42 @ 250 "	2 to 4 x 4

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BETHLEHEM SUPPLY

Personnel Changes Made By C.P.S. Inc.

Mr. Harry H. Hillman, President of California Production Service, Inc., announced that the Board of Directors of the Company, in its annual meeting held on July 10th made the following changes among its officers:

Mr. Charles K. Eastman, Vice President, elected Executive Vice President.

Mr. Jack N. Hillman, General Superintendent, elected Vice President, Manager of Field Operations, and Director.

Mr. Chas. E. Riemann, Executive Assistant, elected Vice President-Comptroller.

Mrs. Miriam Wasteneys elected Assistant Secretary.

Mr. Paul Cordary elected Assistant Treasurer.

Mr. Hillman stated that the growth and expansion of the Company has made necessary this broadening of the managerial staff.

The new chairman of the petroleum committee of the Greater Bakersfield Chamber of Commerce is Walter Rowse of Intex Oil Company. He succeeds Carl Lundblade, who recently moved to Pasadena.

Sunny skies and balmy breezes have lured C. P. (Doc) Watson to his San Diego County Ranch for a well-earned rest and vacation. His offices are in the General Petroleum Building, Los Angeles.

First California Company announces that it has engaged the services of Daniel J. Pickerell of San Francisco as petroleum consultant. Pickerell, a Stanford graduate, was formerly petroleum officer for the 12th Naval District. First California Company maintains memberships in four stock exchanges and has 33 offices serving investors in California and Nevada.

Neal H. Anderson of Long Beach, long identified with the California oil industry, is on a year's vacation travelling through Europe. He left Los Angeles International Airport the other week by a Polar route plane for Copenhagen to start his junket.

Johnston Pump Company Expands Industrial Sales

Paul S. Chapman, former district manager of the San Francisco office of Johnston Pump Company, has been elevated to the position, manager, industrial sales, for that company, according to C. J. Schleeweis, sales manager.

Paul S. Chapman

"We are increasing our emphasis on the application of our industrial pumps in order to improve our service and to strive for more standardization of our product. The increasing acceptance of our pumps for remote controlled gasoline station application as well as the success in the handling of butane, propane and other hazardous liquids has prompted us to move Mr. Chapman into this position," Mr. Schleeweis said.

Chapman comes to this new position with a wide background of pump experience. He attended the Universities of Maryland and North Carolina State, majoring in mechanical engineering, and has been employed by Johnston since 1951.

Oil Men Samuel B. Mosher and Ralph K. Davies are among American stockholders of Humpty Doo, a proposed $50,000,000 rice growing project in Australia. Humpty Doo, an Australian expression meaning "okay," is an area on the sub-coastal plain in Northern Territory, about 30 miles southeast of Darwin. Sponsors are hopeful of developing 750,000 acres within a 15-year period.

John Muir was in charge of the engineering phase of the recent pool discovery chalked up by Mariposa Company in the Arvin-Mountain View area of Kern County.

Election of A. C. Allyn Jr. as a director of Oceanic Oil Company has been announced. Allyn, who fills the vacancy created by the resignation of John W. Chapple, is a partner of A. C. Allyn & Co., Chicago, member of the New York Stock Exchange.

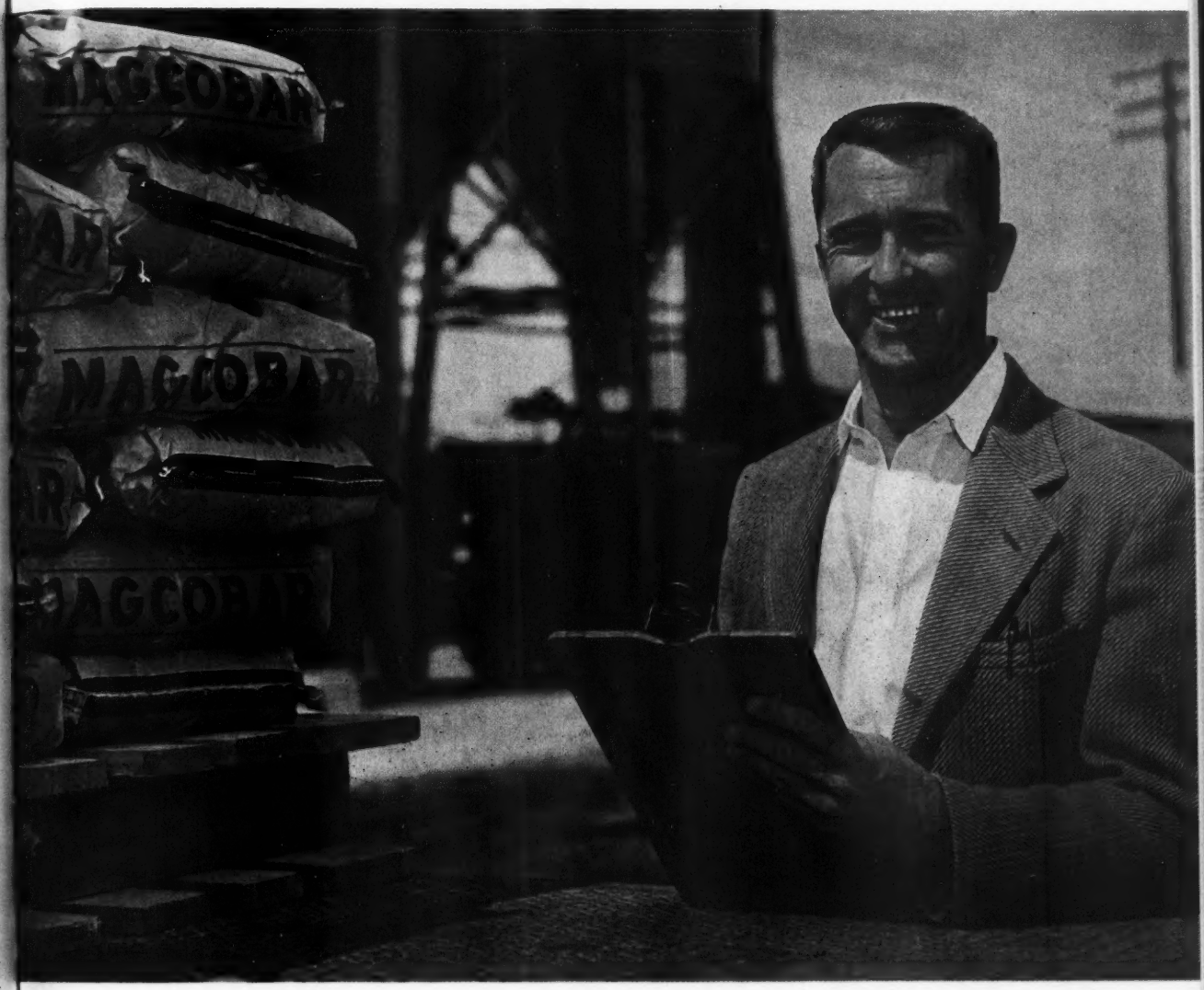
J. M. Evans has been appointed Assistant Vice President of Standard Oil Company of California to provide engineering counsel to Standard's operating companies. Evans, previously Chief Engineer, has been engaged in design and construction activities since joining the company in 1915.

Succeeding him as Chief Engineer and head of the company's Engineering Department is E. S. Warner, who has been Assistant Chief Engineer since 1947. Warner joined Standard in 1936 as an assistant engineer.

Jack Crawford of Long Beach, who at the age of 25 owns outright or has a stake in 33 producing wells, will leave this month for a vacation of three and one-half months in Europe. He will embark on an Italian Liner in New York and will first go to Germany where he plans to purchase a Porsche Speedster for touring. Countries on his itinerary include France, Spain, Portugal, Italy, Switzerland and other interesting places on the other side of the Atlantic. Jack, a University of Southern California graduate, will be accompanied by his brother, Don, who is an SC undergraduate. While in Europe, Jack will look up a fraternity brother, Ed Lloyd Jr., who was a SC senior when he enlisted in the Army in August, 1954. Lloyd is on a special piano playing assignment with the 7th Army Symphony and Soldier Show.

Oil Man R. K. Summy of Long Beach has been elected second vice-president of the American Association of Petroleum Landmen for the ensuing year.

It takes a complete team to keep dependable drilling mud service available for you



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Your Magcobar Dealer has hitched his future to the oil industry. He's an independent, local businessman who has elected to represent Magcobar in the field because he's convinced of the quality, resources and field service facilities in which Magcobar has invested millions of dollars to back up his stocks of materials. When you need mud, look for the Magcobar Dealer. He's the "front man" of a complete Magcobar team. He's ready to serve you with the most complete line of drilling mud products and service in the field.

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MAGNET COVE BARIUM CORPORATION

Houston, Texas

COPPER is a metal with a future even brighter than its long and useful past. The giant steps being taken today in the electric and electronics industries have given it more to do than it ever had before. Result: more and more copper ore is being taken from the earth. As is the case in so many other industries, efficient operation depends to a great extent on efficiently lubricated equipment. We of The Texas Company are happy to have had a hand in this job for the copper industry. In fact . . .

For over 20 years, more copper ore in the United States has been mined with Texaco-lubricated equipment than with any other.

The Texas Company

TEXACO

Recovery Experiment Underway at So. Belridge

The third or combustion phase at the thermal recovery experiment at South Belridge oil field, Kern County, is underway.

The ignition in the oil reservoir, at a depth of approximately 700 feet, commenced a few days ago. The progress of the combustion underground will be regulated by the air which is to be applied by the compressors installed for that purpose. Results of this phase of the project will not be known for some time, General Petroleum Corporation engineers, who are conducting the experiment with the support of a group of oil companies, said.

The ignition is one part of the over-all experiment which is expected to take between 2 and 3 years. It was started last year.

Purpose of the South Belridge field experiment is to ascertain if thermal recovery, which is also known as in-situ (in-place) combustion, is feasible from both an engineering and economic standpoint as a secondary recovery method for producing low gravity crude which is unrecoverable by any other means.

Combustion of oil in place is achieved by igniting it after the oil sands have been permeated by air pumped into the zone through an injection well. The rate of combustion can be regulated by the amount of air injected.

From a conservation viewpoint, no usable oil is expended in the thermal recovery process. The usable oils are pushed ahead of the burning front after their viscosities have been reduced. Only a portion of otherwise unrecoverable heavy residual of the oil actually is burned.

The experiment is being conducted in the upper portion of the Tulare oil zone.

Byron Jackson Pumps' New Film Shows Pretesting Of 400 MGD Pumps

Byron Jackson Pumps, Inc, announces a new 18-minute, full-color sound film entitled "Model Test Pit for 400 MGD Pumps." This film—actually an engineering report — shows how the engineers at Byron Jackson thoroughly pretested the BJ pump installation for the giant Tidewater refinery in Delaware — the largest new refinery ever built.

This filmed report shows the tests that were made in Byron Jackson's Los Angeles Hydraulic Laboratory where a model tank—along with nine model vertical circulating pumps — was constructed to duplicate the actual field operation at Delaware. The tests — designed to answer the unique hydraulic problems of the Tidewater project—consisted of studies of water flow, swirling, effect of opening or closing entrance gates, possible concrete cavitation, permissible minimum water level, effects of high tide, and arrangements of intake gates and screens. Extensive animation is used in the film to demonstrate variations in pumping situations.

This film is available to all interested groups and organizations. Write Byron Jackson Pumps, Inc., P. O. Box 2017A, Terminal Annex, Los Angeles 54, California.

Hot Air Sparks Petroleum Recovery

Standard Oil Company of California, in common with other big operators, is engaged in an underground combustion experiment to promote more complete recovery of known oil resources. California Research Corporation, a company subsidiary is carrying on the work in the Midway-Sunset field after more than a year of preparation, which included drilling the wells and setting up recording and control devices. The method involves forcing air down the well under high pressure into depleted oil sands. Oil recovered in the sands is then ignited which in turn makes the compressed air hot and pushes it toward surrounding wells. It happens then that the heavy crude oil literally boils and heads for the surface. Exacting recording and control instruments have been put in place to regulate the burning rate of the subface fires. Standard's experiment is designed as a "four well pattern," or in other words one well was drilled for the compressed air injection and the fire and three other wells put down to bring the oil to the surface.

Proud parent, on meeting the new first grade teacher: "I am very happy to know you, Miss Jones. I'm the father of the twins you are going to have next September."

Workers at the South Belridge thermal recovery experiment check instruments which normally are found only at refineries.

Field Development

Huntington Beach Wells On Production

New producing wells in the Huntington Beach field include A. H. and Doris D. Trester's Pope-Draper No. 1 on Section 10-6s-11w, which at last reports was accounting for 44 barrels of 20.2 gravity oil a day, cutting 30 per cent. The Hamilton & Sherman, Operator, State No. B-3 on the section is in at 3791 feet for 69 barrels daily of 21 gravity crude, with a cut of 7.7 per cent. In the same sector, Custom Drilling Company's Custom No. 1 went on production at 3848 feet and currently puts out 48 barrels a day of 20 gravity oil, cutting 39 per cent. Signal Oil and Gas Company's Signal-Bolsa No. 171 on Section 29-5s-29w has reached 5850 feet, and its State 426 No. 139, 8392 feet. Both rigs have been shut down at these points for a vacation period.

Beverly Hills Test Fishing

Universal Consolidated Oil Company at this writing was down 11,835 feet with its 20th Century-Fox No. 9 deep test in the Beverly Hills field and fishing drill pipe. The well is the ninth the company has put down on its 260-acre lease and is going far deeper than any other project in the field. The greater part of previously developed production was established near 7000 feet. Sun Drilling Company is the contractor on the Universal campaign at Beverly Hills.

Coastal-Northern Project Drilling

Union Oil Company has just started the drill with its Van Couvering No. 1 wildcat test on Section 15-3n-20w in the Balcom Canyon area of Ventura County. In the Bardsdale area, the company's Irwin Berylwood No. 1 explorer on Section 12-3n-20w is making hole ahead at 6000 feet, with K. L. Kellegg & Sons doing the work. Redrilling is moving ahead at 8600 feet with the company's Torrey No. 90 well on Section 5-3n-18w in the Torrey Canyon field. Original bottom is 9050 feet.

Colusa County Wildcat Quits

Shell Oil Company has recorded an abandonment in the Williams area of Colusa County. The production failure was Baker No. 61X-27 on Section 27-15n-2w which stopped at 3182 feet. In the Arbuckle area, Western Gulf Oil Company's Alexander No. 1 on Section 34-14n-2w is drilling at a point near 7000 feet. In the Rio Vista area in Sacramento County, Standard's Borba Community No. 5 on proved ground is drilling at 1800 feet. The well site is on Section 13-4n-3e.

Lancaster Test Idle

Drilling has come to a temporary stop at 2400 feet with the wildcat well undertaken by Cedric E. Brown Gas & Oil Company on Section 5-7n-11w in the Lancaster area, Los Angeles County.

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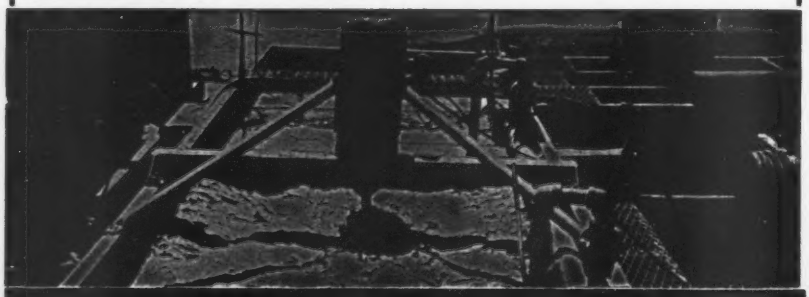

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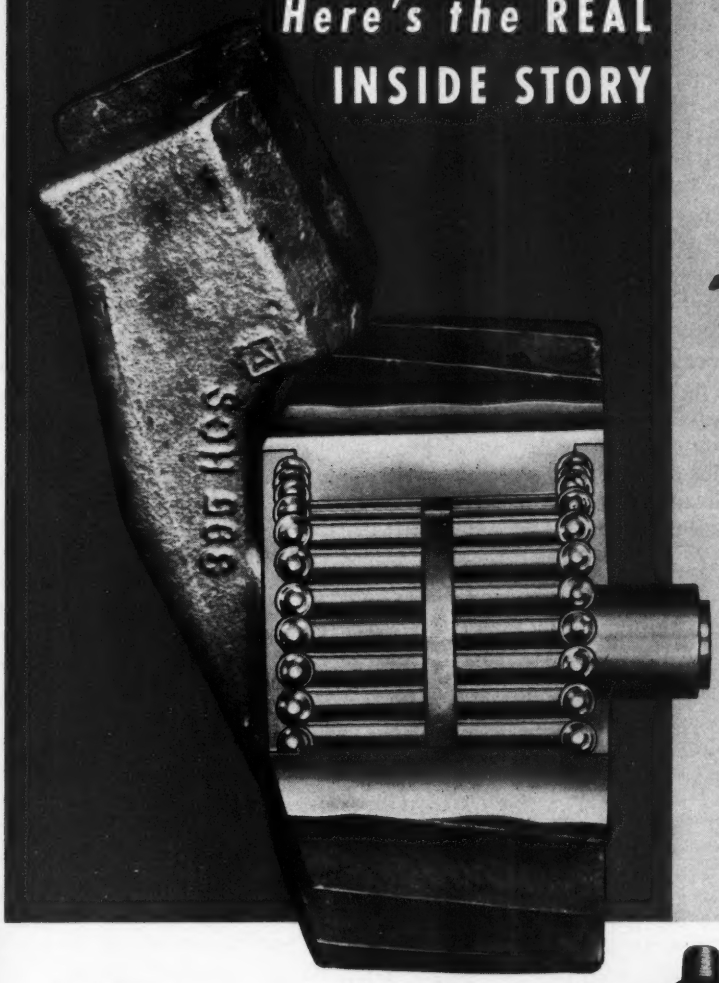

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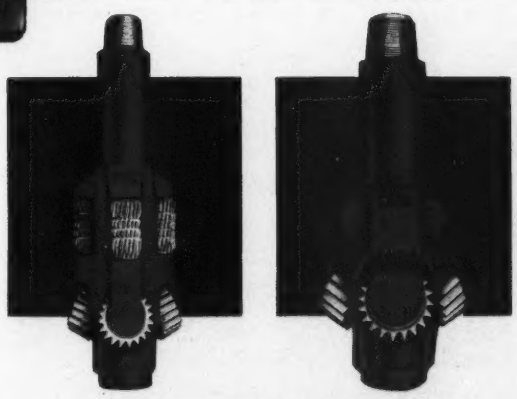

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Ventura County Wildcats Staked

New wildcats ready to begin drilling in Ventura County include The Texas Company's Lawton No. 1 on Section 27-4n-19w in the Fairview Canyon area. It is designated at 14,500-foot test. In the Wiley Canon area, Western Gulf Oil Company will drill Hunter No. 1 on Section 6-3n-18w. Target depth is 8300 feet.

Shiells Canyon Well Off The Board

In the Shiells Canyon field of Ventura County, discovered by Montebello Oil & Gas Company in 1911, The Texas Company's Elkins No. 13 well on Section 6-3n-19w has been abandoned. The well was drilled to a total depth of 5280 feet. In the Tapo Canyon field, Sunset Oil Company's Tapo No. 17 well is being made ready to drill.

San Mateo County Wildcats Working

Something like 3500 feet is the objective depth of Richard Oil Company's Fatjo-Tucker No. 1 wildcat on Section 35-7s-3w in the La Honda area, San Mateo County. Union Oil Company as operator has reached approximately 5600 feet with Western Gulf-Richfield-E. L. Moore et al No. 1 on Section 31-7s-3w at Peters Creek. Western Gulf's Wells-Fargo No. 1 on Section 7-8s-3w in the Oil Creek area is making headway toward target level of 7500 feet.

Whiskey Slough Wildcats Listed

Humble Oil & Refining Company has staked George Speckman et al No. 1 wildcat on Section 4-1n-5e at Whiskey Slough in San Joaquin County, and Arcady Oil Company, Holt No. 1-9 test on Section 5-1n-5e in the same area.

Mount Poso Well Pumping

Signal Oil and Gas Company's Signal-Glide No. 31-2 on Section 31-27s-28e, a brand new find west of the Mount Poso field at last reports was pumping at the daily rate of 54 barrels of 16.8 gravity oil, cutting about 60 per cent. Total depth of the well is 2615 feet.

Eel River Test Digs

On a block of 5000-acres several miles southwest of the Tompkins Hills gas field, Sunset Oil Company's Sunset-Signal-Eel No. 1 explorer on Section 25-3n-2w in Humboldt County is drilling at 3500 feet. Based largely on seismic studies by Geophysical Services, Inc., the wildcat is programmed for 7000 feet for a test of sands comparable to those at Tompkins Hills.

Poso Creek Find Pumps

Current yield of Bankline Oil Company's De Pauli No. 1 discovery well on Section 19-27s-27e, one mile north of the Poso Creek field, is 52 barrels of 13.3 gravity oil, cutting slightly from a total bottom of 2815 feet. The sand cut has been showing a decline by a slowing up of the pump.

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Dominguez Field Adds New Development

Union Oil Company's development work at the northwest edge of the Dominguez field has accounted for a new 1405-barrels-a-day well on Section 29-3s-13w. The well, Callender No. 143, was drilled to 7945 feet and finaled for 1405 barrels of 30 gravity oil and 1,280,000 cubic feet of gas a day from the 7th and 8th Callender zones. This is the seventh successful completion scored by the company in the new development in this part of the field. J. K. Wadley as operator has five wells going at different stages in the field.

Santa Fe Springs Deep Test Staked

Edward Nepple of Bakersfield has staked location at Santa Fe Springs for SP-Pedro-Nepple No. 1 deep test on Section 6-3s-11w. Engineering is in the hands of Roy Mead. Among new producers from the deeper zone at the "Springs" is General Petroleum's Santa Fe Community No. 179-A on Section 6-3s-11w near Bloomfield and Telegraph roads. Drilled to a bottom of 908 feet, initial yield was 623 barrels of 33.8 gravity oil and 1,981,000 cubic feet of gas a day. The well more recently has been putting out 763 barrels of 35.4 gravity oil, cutting eight per cent, and 3,670,000 cubic feet of gas daily.

Chino Hills Test Finaled

James Michelin as operator for Bill Geis and Bill Thornbury has put on production another wildcat well in the San Bernardino County Chino Hills. The well, Abacherli No. 6 on Section 12-3s-8w, was drilled to a total bottom and then plugged back to 2100 feet. It was started off at the daily rate of 60 barrels of clean oil a day on the pump. The crude tested 26 degrees gravity.

Sylmar Wildcat Goes Off Board

Drilled first to 10,136 feet and then redrilled to 8375 feet without commercial success, Western Gulf Oil Company's Carey No. 1 exploratory well on Section 4-2n-15w in the Sylmar area of Los Angeles County has gone the way of all dusters.

Edison Well On Production

Inca Petroleum's Mark Morris-Harris No. 3 on Section 26-30s-29e at Edison is in from 2700 feet for an initial pumping output of 35 barrels of 15.5 gravity oil a day, cutting five per cent.

Packwood Test Drilling Ahead

Sunset Oil Company is drilling below 3000 feet with its Shell-USL No. 1 wildcat test on Section 17-27s-18e in the Packwood Anticline area, Kern County. Together with associates, Sunset holds 568 acres in the area, with the test looking for Avenal sand production at an anticipated depth of 3200 feet.

Belgian Wildcat Goes Into Discard

What was looked for evidently could not be coaxed out with the result Shell Oil Company's AML No. 111-17 test on Section 17-30s-21e at Belgian Anticline has been abandoned at 3908 feet.

Fruitvale Field Well on Production

Berry Holdings Company's Texas-Underwood No. 82 well on Section 16-29s-27e in the Fruitvale field came in from 3891 feet for 136 barrels of 13.7 gravity crude oil through a 16/64-inch orifice.

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Union Pacific Railroad's well No. 696 being put down on Terminal Island by the Marine Drilling Company. Left to right: E. Kersey, driller; M. J. Williams, derrick; H. A. West, cathead; E. B. Bishop, racker; J. H. Smith, lead tong.

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Oxnard Wildcat All Set To Dig

Standard Oil of California is ready to drill its Donlon Community No. 1 wildcat test on Section 11-1n-22w in the Oxnard area of Ventura County. Location is one and one-half mile southeast of Oxnard townsite and a quarter-mile southeast of the intersection of Rose and east Woodley roads. It is roughly at the southwesterly point of a northeast-southwest line of Lloyd Corporation's Power, Borchard and Livingston properties, and Standard Oil's McInnes, Pfeiler, Todd and Maulhardt leases. Richfield Oil's Oxnard Community No. 1 test on Section 3-1n-22w has been abandoned at 12,340 feet.

Mutau Flats Well Testing

Oil Land Development Company has taken over Marvel No. 1 wildcat on Section 28-7n-21w in the Mutau Flats area of Ventura County and at last reports was perforating and testing. The well, bottomed at 5023 feet, formerly was operated by Wilson Peterson Oil Company and later by Marvel Petroleum Company.

Ventura Avenue Well Completed

Flowing at the daily rate of 279 barrels of oil, cutting 5.4 per cent through a 20/64-inch bean, Shell Oil Company's Taylor No. 526 well is in from 8375 feet on Section 30-3n-23w in the Ventura Avenue field. On Section 21-3n-23w, Bolsa Chica Oil Corporation's Hartman No. 101 is a location. Terminal Drilling Company drilled the Shell producer and has been awarded contract on the Bolsa Chica job.

Santa Barbara Adds Explorers

Two new and interesting wildcat tests are at the starting line in Santa Barbara County. General Petroleum Corporation will drill Neotsu No. 11-13 on Section 13-9n-33w at Elizabeth Canyon, and Mohawk Petroleum Corporation, Dolman-Price No. 1 on Section 16-8n-32w at Cat Canyon. In the Lompoc area, Roy Wattenbarger has given up Fickert No. 1 on Section 8-7n-33w after deepening the well.

Lost Hills Test Drills

Drilling is going forward at 8300 feet with Universal Consolidated Oil Company's Fee No. 265-32 deep test on Section 32-26s-21e in the Lost Hills field in Kern County. The project is aimed to some 8500 feet for a test of the Belridge 64 sand. Location is on 370 acres of fee ground, which Universal owns in addition to its 160-acre tract of Government land at Lost Hills. Contractor is San Joaquin Drilling Company.

Riverdale Wildcat Preparing To Start

Malco Asphalt & Refining Company is engaged in work preliminary to starting the drill with its Mattie C. Cobb No. 1 on Section 1-18s-19e, five miles south of Riverdale. As listed the project will be taken down to 8000 feet for a test of Miocene and Eocene zones. Over in the Burrel Ranch area, Occidental Petroleum Corporation's Burrel No. 73-7 on Section 7-17s-19e, a Miocene discovery, was last reported producing 85 barrels of 32 gravity oil a day, cutting more than 50 per cent, from 6798-6815 feet. The well is bottomed at 8300 feet. It is situated one and one-quarter miles east of The Texas Company's Southeast Burrel pool discovery well. Texaco's Lillis (NCT-1) No. 1 wildcat on Section 20-21s-16e, east of the Jacalitos field, is drilling below 1000 feet. Flowing 100 barrels of oil a day through a 10/64-inch bean, Arcady Oil Company's Noble No. 2-4 test on Section 4-15s-17e in the Raisin City area is in from a total depth of 5260 feet.

North Fruitvale Explorer Tabled

Having recovered casing from its Law No. 13-3 wildcat on Section 3-29s-27e at North Fruitvale, Intex Oil Company has abandoned the well at a bottom of 3498 feet. Nothing of interest evidently showed up on the way down.

Mountain View Wildcat Drilling

Union Oil Company's Stenderup et al No. 55-X-21 on Section 21-31s-29e in the Mountain View area of Kern County is moving steadily ahead in a test designed for 11,000 feet, plus or minus. Clyde Hall Drilling Company is in charge of operations which are about five miles southeast of the company's Clendenen No. 45-S-30 on Section 30-30s-29e. The latter, comparable to the current wildcat, was seeking Vedder production and was carried all the way to 10,510 feet, but failed to accomplish its mission. It was finally abandoned at a redrilled depth of 6327 feet. The relatively shallow Santa Margarita zone evidently was not productive. Mariposa Company's Kovacevich No. 73-35, a new pool discovery in the Arvin-Mountain View area on Section 35-31s-29e, is putting out 36.1 gravity oil at the rate of 120 barrels a day along with 20,000 cubic feet of gas. Drilled to a total depth of 8250 feet by Miller & York, the Derby sand was topped at 8018 feet. The find is about one mile northwest of The Texas Company's Vaccaro pool discovery completed last September on Section 35-31s-29e.

Hancock Oil Company's Alamitos No. 12 being put down at Seal Beach with K. L. Kellogg & Sons crew on the job. Left to right: Jimmy Cochran, pusher; N. C. Torpey, driller; O. Morrow, derrick; M. L. Bender, cathead; F. Beck, pipe racker and K. R. Kelso, lead tong.

Rio Bravo Test Digs

With target depth some 5900 feet, Union Oil Company at last reports was drilling at an intermediate level with its Kernco No. 61X-34 test on Section 34-28s-25e in the Rio Bravo sector, Kern County. The contractor is Miller & York. In the Rio Bravo field, Superior Oil Company's Osborne No. 1-7H on Section 28-28s-25e is making hole below 9000 feet.

Tejon Wildcat Drills Steadily

Reserve Oil and Gas Company's Reserve-JJL No. 77-14 wildcat test on Section 14-11n-19w in the Tejon Ranch area is drilling under 6000 feet. Location is two miles northeast of production in the Tejon-Grapevine field, with the well slated for 8300 feet.

Helm-Lanare Well Inactive

Idle for a time at 7250 feet appears the present status of Dumm Bros. Petroleum Corporation's Steines No. 1 well on Section 30-17s-19e in the Helm-Lanare area of Fresno County. The Miocene was topped at 6889 feet.

Temblor Well Drilling Ahead

Drilling is several hundred feet down with B. F. Delanty's No. 30 well on Section 36-29s-20e in the Temblor field, Kern County, where some oil has been produced for close to 60 years. In the Welcome Valley area, L & S Oil Company's Aron No. 3C on Section 6-26s-19e just now is idle at 366 feet

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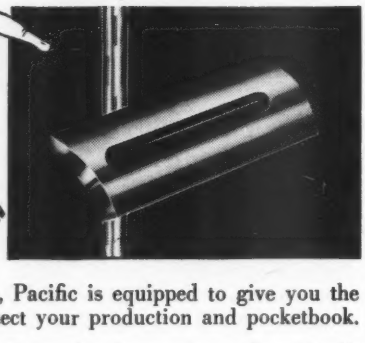

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Jerry Slough Find Producing

At Jerry Slough, six miles north of Buttonwillow in Kern County, The Texas Company's Breen No. 1 wildcat test on Section 14-28s-23e is giving up 50 barrels of 34.7 gravity oil and 170,000 cubic feet of gas a day from 12,040-12,140 feet. The well was carried to a total depth of 13,733 feet before plugged back to 12,310 feet for tests. Swabbing test off the lower part of the well indicated it was wet. The well scored oil production in a sector that has long produced gas.

Wheeler Ridge Project Working

With Knight & Williams in charge as contractor, Richfield Oil's ROC-KCL G No. 31-27 Wheeler Ridge extension test is drilling at 4500 feet or thereabouts. Located on Section 27-11n-20w, the well is aimed for a Miocene zone below 5000 feet.

Devils Den Venture Digs

General Petroleum Corporation is on the way with Alferitz No. 32-3 test on Section 3-25s-18e in the Devils Den area of Kern ounty. The well offsets the Bandini Petroleum Company University of California No. 3 discovery well on the section. General will go to some 4100 feet in an effort to duplicate the fresh production uncovered in the Point of Rocks formation by Bandini. The Bandini well went to a total depth of 4150 feet and started off from the gun-perforated interval of 3553-3561 feet at the rate of 136 barrels of 43.8 gravity oil a day. The project was guided to success by Martin & Stevens Drilling Company.

South Strand Test Drilling

One and one-half miles north of the Ten Section field, Shell Oil Company's KCL No. 34-17 wildcat on Section 17-30s-26e in the South Strand sector continues to drill steadily ahead at a depth last reported near 5000 feet. Camay Drilling Company is handling the drilling of the project, which will give a good look at the Basal Stevens sand zone. This sand was assured productive a year ago in both the Strand and East Strand sectors lying north of the present test.

Kettleman Hills Wildcat Redrilled

Petan Company's Norris Whepley No. E-5 well on Section 35-21s-17e at Kettleman Hills in Kings County is at a redrilled depth, according to a recent field check. Original bottom was 11,560 feet.

Shafter Try Interesting

Geochemical Surveys, Inc., of Dallas, Tex., which not many months ago made its bow with California operations, is moving ahead at a preliminary stage with its KCL No. 23-25 wildcat on Section 35-27s-24e at Shafter in Kern County. The drilling contract has been assigned to Gene Reid Drilling Company.

Seal Beach Well Finaled

Hancock Oil Company's Alamitos No. 18 on Section 13-5s-12w in the Seal Beach field has been finaled at a plugged depth of 6695 feet for a flow of 468 barrels of oil a day, through a 21/64-inch bean, cutting six per cent. Hancock's Alamitos No. 19, meantime, is drilling at 3000 feet. Continental Oil's Bixby No. 65 deeper pool test on Section 3-5s-13e continues to drill ahead below 10,800 feet.

Tulare County Wildcat Staked

Brown & Soults of Orosi has staked location for a new wildcat on Section 32-20s-27e in the Strathmore area of Tulare County. Interest in the area largely is the result of oil showings in water wells put down here and there. The new test is not designed to go much deeper than 1000 feet.

Templeton Test Listed

All set to spud is Camrich Drilling Company's Zimmerman No. 1 explorer on Section 14-27s-12e in the Templeton area of San Luis Obispo County. On the Iversen Ranch, The Texas Company has abandoned at 2436 its Iversen No. 1 wildcat on Section 15-27s-16e.

Buena Vista Well Drilling

Golden Bear Oil Company is moving ahead with development of the Mulinia sand extension pool which it opened four months ago in the Buena Vista field. Beside the discovery well, Golden Bear has already completed one other well and is under way with a third — Golden Bear-Mitchel-Fairweather No. 27-16 on Section 16-31s-23e. No. 16-16 will follow the present job on the section.

Orange County Wildcat Staked

Shell Oil Company is doing preparative work for its Irvine No. 1 wildcat project in the Newport area of Orange County. The wellsite is on Section 17-6s-10w and near the intersection of Atlanta avenue and Wright street. In the Westminster area, the company's Anaheim-Sugar No. 1 venture on Section 9-5s-11w is being redrilled by U. S. Drilling Company at a depth last reported around 9000 feet. The first time down the well went to 11,461 feet. In the Richfield area, Aeco Corporation, headed by Mark D. Leff, will drill Nohl-Bixby No. 1 on Section 12-4s-9w. It is a 2500-foot test. Red Star Oil Company's Irvine No. 1 explorer on Section 9-5s-9w on the Irvine Ranch is digging at 2100 feet.

Union Pacific Railroad's well No. 397-R in the Wilmington field with Terminal Drilling and Production Co. putting down the hole. Left to right: J. R. Dickenson, driller; L. H. Davis, derrick; E. L. Kreutz, cathead; N. H. Dollar, lead tong and W. N. Rodgers, racker.

Bandini Field Adds Producer

General Exploration Company has completed its 18th producing well at Bandini in East Los Angeles through the medium of CWOD No. 20, which came in from a total depth of 5909 feet flowing 405 barrels of 41 gravity clean oil a day through a 16/64-inch bean. General now owns more than 1600 barrels of produce oil a day in the field. Richfield's Southside No. A-12 on Section 7-2s-12w is also in from a redrilled depth of 5708 feet for 177 barrels of 41 gravity oil through a 15/64-inch orifice, cutting initially 17 per cent.

Culver City Well Drilling

Edwin W. Pauley's Aladdin Community No. 1 well on Section 6-2s-14w near Washington and Robertson boulevards in Culver City is drilling ahead at 7100 feet and largely in the no dope category. The operator holds some 500 acres bounded on the west of the Hillcrest Club in Los Angeles and the Pacific Electric right-of-way in the Culver City industrial sector. The well is being slant drilled from the PE property to the Los Angeles ground on which subsurface easement have been acquired.

Las Varas Test Digs

On Section 12-4n-30w in the Las Varas area of Santa Barbara County, Standard Oil's Edward Estate No. 3 wildcat is drilling steadily ahead around 3500 feet. In the West Montalvo area of Ventura County, Standard's Bailard-Mee No. 1 on Section 29-2n-22w keeps redrilling at a depth last reported near 13,900 feet. Original bottom is 15,006 feet.

The Beacon, a monthly magazine published by and for the employees of Ohio Oil Company, will celebrate its 20th birthday in August, 1956. Contents of the publication are due largely to the active cooperation of the many Beacon reporters associated with Ohio in different parts of the country.

With Drilling Contractors

Gold Metals Consolidated Mining Company, which the other month extended its interests to the development of oil and outside contract drilling, has acquired the services of R. A. (Bud) Provost and William H. (Bill) Berge to supervise the oil production department. The two widely known oil men have been operating the Cardinal Drilling Company as a separate contracting unit. Berge came from Utah to California in 1930 to enter the oil business and made his debut in this direction in the Bakersfield area. Provost first saw the light of day in Coalinga and his oil career began on a rig during the Kettleman Hills boom. The two oil men met at this time. Provost subsequently became superintendent of drilling for the Union Pacific Railway in the Los Angeles Harbor district. During his seven-year supervision for the railway some 350 wells were completed. At about this same time in the mid-1940s Berge was appointed general field superintendent for Drilling & Exploration Company and went to Brazil to guide the firm's work in the South American Republic for seven years. On his return to the United States, he with Provost organized the Cardinal Drilling Company. Contract work was conducted for both large and small companies and in the last five years Cardinal was practically exclusive contractor for Neaves Petroleum Developments of Beverly Hills.

Under this association no less than 40 wells were drilled for the Neaves organization. Provost has supervised the Beverly Hills oil company's Texas operations.

First Contract

Gold Metals first contract drilling job under the new set up will be for Brookline Oil Company in the Long Beach district. A seven-well drilling campaign has been mapped out on Brookline's lease, south of Anaheim boulevard and west of Henry Ford boulevard in the harbor sector. These seven will evidently be whipstocked from a location in the area to the objective main zone. The program will open with the immediate drilling of a pair of wells. These operations will temporarily be carried under the Cardinal banner as a subsidiary until such time as direct activity can be established.

Union Oil Company, which assigns all drilling to the contracting industry, has scheduled exploration work for the last six months of 1956 on about the same basis as in the first half-year. Listed for all divisions, which includes Canada and the company's Central American interests, are 52 exploratory wells. Of the total 23 are joint interest projects for which either Union or another company will act as the operator. The tentative division drilling calendar denotes 10 wells for the Pacific Coast, 14 for the Gulf, four for the Rocky Mountains, three for Oklahoma, 14 for Canada and one for foreign operations. It was officially observed by Union's exploration and land department that the anticipated results of this wildcat campaign will develop a number of areas of new production and provide added oil and gas to replace current production and boost company petroleum reserves.

Cognizant of the rising number of wells put down each year, General Electric Company notes that the drilling industry is providing a progressively increasing market for electric drives. It was pointed out that in 1945 some 26,880 wells were drilled, in 1955 about 57,000, and that there must be approximately 81,000 oil wells a year drilled by 1975 to keep step with the growing use of petroleum.

Camrich Drilling Company's banner derives its name from owners of the company—Clyde Campbell and B. H. Richards.

The many friends of Katherine Riley, wife of J. T. Riley of the Rocky Mountain Drilling Company, were saddened by her recent passing. Mrs. Riley, who was born in Long Beach in 1907, had resided in Bakersfield since 1942.

Al Godfrey Drilling Company of Long Beach has staked location for Godfrey No. 1 in the Panoche Hills, San Benito County. The well site is 646 feet south and 1010 feet west from the northeast corner of Section 24-16s-10e.

Gene Reid Drilling Company is handling the contract work on Ohio Oil Company's KCLN No. 53-31 wildcat on Section 31-31s-26e in the Buena Vista Gas Field area, Kern County.

Atherton Oil Company has let contract to B. J. & M. Drilling Company for its Atherton-Day No. 85-8 wildcat test located about two and one-half miles south of Woodland in Yolo County. The project will be drilled to some 6500 feet.

Cuban Interest Taken By Eureka

Eureka Company of Los Angeles has reported completion of a deal with George Noonan under which Eureka acquired 10 per cent interest in the United States-Cuba Oil & Drilling Corporation. Noonan is general manager of the Cuban organization, whose concession is described as containing 150,000 acres onshore and extending into shallow water. It was reported offset by ground held by Shell Oil Company on two sides and Stanolind and Sibiney in the other directions.

Rocky Mountain NEWS

Colorado—Idaho—Montana—New Mexico—Utah—Wyoming—Western Canada

General

If the promise made by the number of well completions in the region through June is carried through in normal fashion, 1956 will be another record year in the Rocky Mountains. At the end of the first six months, operators in the area had completed 2,284 wells, or 392 more than were finalized in the first six months of 1955.

Each of the active states in the region registered strong gains, with the exception of Colorado, which is down slightly from a year ago, due to some slack-off in the Julesburg Basin. Colorado's midway total was down by only 65 completions, and this deficit was more than made up by the other states.

Biggest apparent problem on the horizon which could slow down drilling unreasonably is the present shortage of steel. Although operators have foreseen the coming of the steel strike, steel has never been overabundant in the region since the war, and most supply houses have been unable to build up large inventories. Some operators had in sight only enough pipe for one or two wells, as the strike began.

Western Nebraska, which upped its pace vastly in 1955, has continued at about the same level, and in the first six months registered 193 more completions than in the same period last year. This area also led the region in the number of oil discoveries, with 24 from 251 wildcats.

Montana's completions through the first half was at 183, up 32 from a year ago. Eight oil discoveries were made, from 56 wildcats drilled. This wildcat figure represents a decrease of eight from the total drilled in the first six months of 1955.

Wyoming, oldest oil state in the province, showed an increase of 27 wells over 1955, with the mark of 397, of which 216 made oil wells and 22 made gas wells. Wildcat drilling, also, was up, from 92 to 109, but discoveries at mid-year stood at seven oil and six gas wells. This is a slight sag from a year ago.

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In Colorado, the decline in the Julesburg Basin has been largely offset by an increase in the southern and western areas. From 606 completions, 144 oil wells and 55 gas wells were realized. This compares with 187 oil and 30 gas wells brought in last year. Of the total completions, 299 were wildcats.

Percentagewise, Utah's increase in activity is the greatest in the Rockies, as wells completed shot up from 34 to 64 this year over last. The discovery and subsequent success of the Aneth area of San Juan County is responsible for much of this gain. Thirty-nine wildcats, up 12 from 1955—produced one oil well and four gas wells.

North Dakota showed a gain of 20 wells over last year, up to 128. Five oil discoveries were made in the state, from 33 wildcats drilled.

New Mexico completions showed a good increase, though exploratory drilling fell off somewhat. The first-half total stood at 368, an increase of 168 over the comparable period of 1955.

Montana

Shows of oil in the Mississippian formation have been reported at a rank wildcat in Teton County, Gulf Oil Corp.'s No. 1 Teton-Knowlton, c se sw 8-26n-8w. A drillstem test from 5,500-60 feet recovered 3,550 feet of gas and 350 feet of heavily gas cut mud, with a rainbow of oil. Another test from 5,548-95 feet brought up 90 feet of gas cut mud and 810 feet of sulfur water. Cores previously from 5,530-60 and 5,561-95 feet had shown staining and fluorescence in fractures, while most of the zone was dense. While not very provocative in themselves, the shows are

regarded as significant because of the location of the well. Not only is it remote from established production, it is in the disturbed belt to the east of the mountain front that has been only vaguely tested by drilling, but has been the scene of some of the most intense leasing interest in the state. Some of the highest bid offers have been for leases in this area. This disturbed belt extends north from Lewis and Clark County into Canada, and while no discoveries have yet been made in the United States, it has produced Pembina field, just over the boarder in Canada. The current test is three and one-half miles north of a failure drilled in 1948 by General Petroleum Corp. which went to 7,571 feet in Madison.

In the Ivanhoe area of Musselshell County, R. P. Oliver has recovered 60 feet of free oil on a drillstem test of the Second Cat Creek sand at No. 4 State, sw nw sw 16-11n-31e. While No. 4 State is a northwest offset to Oliver's Heath sand discovery at No. 3 State, it is the first well in the field to test shows in the Cat Creek formation. Production at the field is from Morrison and Heath. The drillstem test, run from 2,540-57 feet, also recovered 540 feet of watery mud.

Also in Ivanhoe field, Gulf Oil Corp. is testing another apparent new pay discovery, the No. 1 DeJaegher, c nw nw 21-11n-31e. At latest report, the operator swabbed seven barrels of oil per hour from the A sand, in the interval 3,955-63 feet. This is the first time this horizon has been shown to contain commercial oil.

The deepest hole ever drilled in Montana, Phillips Petroleum Co.'s No. 1 NP, c lot 2, 33-9s-21e, Berwind area, Carbon County, has been halted at 13,830 feet and plugged back to try to complete in the Elk Basin formation at approximately 8,500 feet. Phillips drilled the well into Amsden, topped at 13,480 feet, and tested from 13,703 - 13,830 feet without finding shows. A drillstem test in Elk Basin, several thousand feet up the hole, recovered heavily oil and gas cut mud. The operator plugged back to 8,685 feet, and was waiting on cement at last report.

Wyoming

Stanolind Oil and Gas Co. has run casing to 6,560 feet at No. 1 Yamba et al, c se ne 11-2n-2w, its apparent discovery in Phosphoria in the Northwest Winkleman area of Fremont County. The operator is reported to have perforated several sections in the horizon, and is testing, but results have not yet been announced. The wildcat is two miles northwest of Winkleman, which has chiefly Tensleep production.

At a deep test in Pinedale area, Sublette County, El Paso Natural Gas Co. has run pipe to the total depth of 15,018 feet, and is testing with unreported results its No. 5 Unit, c se 5-30n-108w. The operator perforated the interval 14,362-14,392 feet. No tops have been reported for the well. El Paso has completed and shut in as gas wells the first four wells in its series. Though the operator has not confirmed the producing formation, it is thought to be the Fort Union. Each well might be classed as a discovery, as they are spaced approximately three miles apart in the huge Pinedale unit. Earlier drilling in the area has been limited to a maximum depth of about 12,000 feet. El Paso's gas from the unit will be turned into the Pacific Northwest Pipeline, when that line is completed.

Three new units have recently been approved in Wyoming. They are the Southeast Zimmerman Butte Unit in Washakie County, Tidewater Oil Co. operator; the Scarlett Ranch unit in Fremont County, Stanolind Oil and Gas Co. operator; and the Blue Mesa unit in Washakie County, Phillips Petroleum Co. operator. Tidewater's unit includes 1,405 acres just southeast of Zimmerman Butte field and northwest of Lake Creek and Kirby Creek fields. Stanolind's Scarlett Ranch unit is much bigger, taking in more than 14,000 acres lying eight to 10 miles southeast of Big Sand Draw field. Phillips has rights on more than 10,500 acres in its Blue Mesa unit, which is three miles northeast of Golden Eagle. The operator is drilling below 11,400 feet at No. 1 unit, ne nw sw 27-46n-96w, a proposed 13,000 foot Tensleep test. There has been no drilling within three miles of this wildcat. No locations have as yet been announced in the other two units.

Colorado

Ajax Oil and Development Co. and Balderson Drilling Co. have recovered

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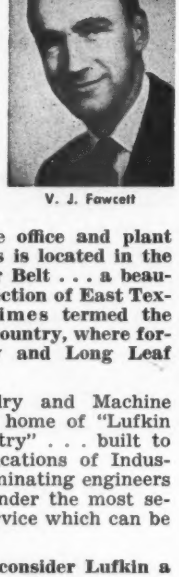
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oil on a drillstem test in D sand at their wildcat, No. 1 Jesse, c ne sw 22-2n-54w, Washington County. The operators recovered 120 feet of muddy oil, 60 per cent oil, and 45 feet of oil cut mud, 15 per cent oil, from the interval 4,787-4,801 feet. No shows were recovered in a J sand core. The crew was drilling ahead at latest report. The well is one and one-half miles east of gas production at Stony Point field.

Four miles southeast of Rangely field, G. E. Kadane has plugged back to the Dakota at No. 1 Moran-Gov't, c sw ne 30-1n-101w, Rio Blanco County. He will attempt to complete the well in that horizon as a gas discovery. A drillstem test in the formation, from 5,773-5,833 feet, recovered gas at an estimated flow rate of 1,100,000 cubic feet per day. The Weber formation was cored, but results were not reported. Total depth is 8,541 feet.

Elsewhere in Rio Blanco County, Phillips Petroleum plans to test the Weber to 17,000 feet at a location about 45 miles southeast of Rangely field. The precise location of the forthcoming deep test is not decided, but it will be approximately 1n-95w, on a 17,000-acre farm-out to Phillips from S. W. McLaughlin, of Rangely. The area is known as Powell Park. It is a westerly trending anticline in the northeastern portion of the Piceance Creek Basin. Wilson Creek field, on the northeastern rim of the basin, is the closest production to the proposed wildcat.

Still in Rio Blanco, Phillips has also reported recovering additional gas from its Hells Hole area wildcat, No. 1 Canyon "B," c sw ne 12-2s-104w. The operator drillstem tested from 7,195-7,270 feet, recovering an estimated 60,000 cubic feet per day. An earlier test from 6,959-7,024 feet brought up an estimated 10,000 cubic feet per day. The operator is coring below 7,490 feet.

Two and one-half miles southwest of Battle Canyon field, in Weld County, Shell Oil Co. has completed No. 1 Lobb, ne se nw 4-10n-56w, as a gas discovery. The well, which is shut in, flowed an estimated four million cubic feet of gas daily during a one-hour test. Production will be from the section 5,916-32 feet in J sand. Casing was run one foot short of total depth at 5,979 feet, but was not perforated.

New Drilling Co. is swabbing its J sand discovery in Washington County, recovering 48 barrels of oil in four hours. The well is No. 1 Smith, c se ne 24-3s-56w. Producing perforations are from 4,948-50 feet. No. 1 Smith is less than a mile northeast of Last Chance field, but is rated as a discovery because it is separated from the field by a dry hole. The Last Chance discovery was finished last year by this operator, pumping 152 barrels of oil daily from the J sand.

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Nebraska

An apparent D sand discovery one mile south of Downer, in Banner County, has been reported for Colorado Century Co. and Murfin Drilling Co. They recovered 370 feet of oil, 80 feet of heavily oil and gas cut mud and 90 feet of filtrate water on a drillstem test of the zone 6,130-49 feet in D sand. The indicated strike is No. 1 Wilson, c nw se 14-18n-56w. Production at Downer is from the J sand. There is no D sand production in the area. The operators were drilling below the tested zone at last report.

Also in Banner County, New Drilling Co. and Sunray Mid-Continent Oil Co. have completed their J sand discovery, No. 1 Ludden, c sw sw 13-17n-57w. The gauge was 151 barrels of oil per day on pump, with production from perforations from 6,822-27 feet. The discovery is five miles distant from nearest production, which is D sand oil in Vedene field. There has been little drilling in the area, and the two latest locations were both failures.

North Dakota

Cardinal Drilling Co., which had poor luck with its Charles discovery, No. 1 UCLI-Sisk, c se sw 1-163n-81w, in Kuroki, Bottineau County, has done better with a just-completed west offset, No. 2 USLI-Sisk, c sw sw 1-163n-81w. The confirmation was completed for 155 barrels of oil per day, pumping from perforations from 3,381-93 feet. Cardinal's discovery well was completed, producing 38 barrels of oil daily, but production fell off, and the operator is testing, after reacidizing. Cardinal will test the pool at another site to the southwest, at No. 1 Munn et al, c ne ne 11-163n-81w.

Utah

Interest in the Aneth area of San Juan County remains high, as the Texas Co. tapped the Paradox formation for a new discovery three miles northwest of the field. The well, Texaco's No. 2 Navajo-G, c se se 18-40s-24e, registered a flow of 436 barrels of oil per day through a one-inch choke on initial tests. The discovery was originally carried as an extension to the field, but the operator has reclassified the well, and it is completed as a new pool discovery. Producing perforations in Paradox are from 5,497-5,537 feet. Texaco is also drilling at No. 3 Navajo-D, ne se ne 19-40s-24e, south of the discovery.

Shell Oil Co., meanwhile, is drilling below 6,000 feet at its No. 3 Bluff unit, ne nw nw 4-40s-23e, six miles northwest of the most westerly production in Aneth area. The well is reported to have tested 2,000 feet of free oil in two hours and 32 minutes on a drillstem test of the Paradox. The operator has not reported tops at the well, which is Shell's third test of the unit.

New Mexico

Gulf Oil Corp. is awaiting a completion rig to finish its discovery at Southwest Barker Dome, in San Juan County. The operator swabbed 110 barrels of high-gravity oil in 11 hours at No. 1 Southwest Barker Dome, c se se 20-31n-15w. Gulf found oil at the discovery in the Tocito formation, in the interval 1,985-2,035 feet. The well is three miles southwest of the closest production, at South Barker field. Oil in this field is also from Tocito. The field was discovered in 1955 by C. M. Carroll, who completed No. 1 Ute for 190 barrels of crude per day. Interest in the area awakened, but there has been no drilling within two miles of Gulf's discovery.

Idaho

A tight hole wildcat in Bear Lake County has been abandoned at 3,900 feet by Eastern Idaho Development Co. It is known as No. 1 State. ne sw 21-10s-43e, and is 12 miles southeast of Soda Springs. The operators have released no other data than the total depth.

Nevada

Sovereign Oil and Gas Co. has staked an exploratory test 35 miles northeast of Las Vegas, in the Meadow Valley area of Clark County. The objective formation for No. 1 Federal, ne ne 29-13s-66e, has not been announced. Fitful drilling of shallow wells has resulted in oil shows in the area, but production has never been achieved.

Western Canada

In the Alix area of central Alberta, Canadian Gulf Oil Co. recovered oil flowing at the rate of 13 barrels per hour from the D2 zone of the Devonian formation at No. 9 McKibbon, LSD 9, 6-40-23w4, four miles southeast of Clive Devonian oil production. The first drillstem test in the formation recovered only gas, which flowed at the maximum rate of over four million cubic feet per day, but the next and deeper test, from 6,034-45 feet, resulted in the flow of oil at the rate of 13 barrels in the first hour and 12 in the second hour of the two-hour test. When the pipe was pulled, it contained 1,183 feet of oil, with no evidence of water. The crew bottomed the hole in the D3 zone, which contained salt water. Prior to the oil's reaching the surface in the last test, gas flowed at the rate of one million cubic feet, and died in 30 minutes. The oil appeared in 42 minutes.

A Saskatchewan operator, Imperial Oil, Ltd., reports that two more in its series of wildcats are indicated successes. They are Imperial-Gainsborough No. 7-19, LSD 7, 19-2-30w1, 11 miles southeast of the Ingoldsby oil field, and Imperial-Kingsford No. 7-21, one and one-half miles north of oil production in the Kingsford area. The best of several drillstem tests at the Gainsborough discovery recovered 1,200 feet of clean oil. All were run in the Mission Canyon formation, around the 3,500-foot mark. Five tests were run in the Charles horizon at the Kingsford location, and all but the first recovered water-free oil.

Interesting Test at Midway-Sunset

Standard Oil Company of California scientists have started a test in the oil bearing formation in the Company's Midway-Sunset field near Maricopa in California, initiating an underground combustion experiment which may result in more complete recovery of known petroleum resources.

More than a year of preparatory work, drilling the wells involved and setting up recording and control devices, has preceded the ignition of the underground formations. It may be another year before the experiment is completed, according to Company officials.

The test is being conducted by California Research Corporation, (a Standard of California subsidiary). The system involves injection of high pressure compressed air into depleted oil sands. Unrecovered oil in the vicinity of the injection well is then ignited with a specially designed tool.

The resulting heat front, forced outward toward surrounding production wells, boils out previously unrecovered crude oil. Rate of burning in the underground reservoir is regulated by control of the compressed air pressure.

The Cal Research experiment is being conducted in a thin sand below 2,000 feet. There is a central injection well from which the fire will proceed outward toward three nearby producers. The site is ringed with older producing wells in the same zone, which will be used as observation wells. Other observation wells near the central well will be drilled later on. The temperature of the combustion front will be followed by temperature gauges installed in these new observation wells.

A 600 hp air compressor will provide excess capacity for the trial, and will be used together with standby compressors for gas supply.

Special metering, gauging, and campling facilities are installed to observe the performance of the test, production increases of the wells, and changes in composition of the hydrocarbon system as combustion proceeds.

Data from the test will be used in an electronic computer to resolve the complicated variables so as to determine as precisely as possible the economics of this new recovery process.

This thermal recovery technique has previously been tested successfully by California Research and The California Company, another Standard subsidiary, in the Irvine-Furnace field in Kentucky.

New PB Mud Gun Features Ball Swivel

Byron Jackson Tools, Inc. announces a new PB heavy-duty Mudjet Gun which combines free-swiveling with positive setting. Described as the only mud gun to feature a ball swivel designed specifically for mud gun use, Mudjet swivels freely on both the horizontal and vertical planes. Free Swiveling is provided by high-strength balls rolling in heat-treated alloy steel races.

Another exclusive PB feature—the Cam-Lok — emphasizes quick positive setting of the gun in any desired swivel position. This new locking mechanism is easily set and released by hand—no tools are required. One Cam-Lok controls vertical rotation and the other controls lateral setting. The Mudjet gun may be left unattended or may be adjusted while in operation.

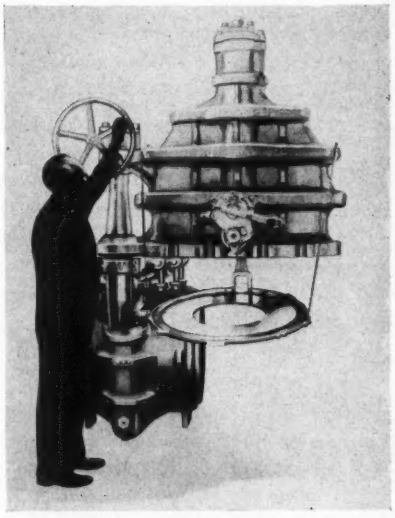
For further information, write Byron Jackson Tools, Inc., P. O. Box 2017A. Terminal Annex, Los Angeles 54, California.

Giant New Orifice Fitting Is One-Man Operated

Standing over eight feet high and weighing five tons, this Commercial Type CS is the largest orifice fitting ever built which can be operated by one man, according to Claude Welcome, president of Commercial Iron Works, builders of the Fitting.

This giant 30", 600-lb. ASA fitting will be installed in a transmission line for delivery of gas from Texas and New Mexico to California. At maximum capacity, operating on 1440 psi line pressure, it is capable of metering 1¼ billion cubic feet of gas per day—enough to supply 3 million homes and a population of 8¾ million people. This is more than the average daily requirement of all the people and industry of Los Angeles city and county combined.

The 4600-lb upper chamber swings out smoothly by turning the handwheel. No ladders or platforms are required, as the crank-operated orifices plate carrier is lowered on its non-rising stem to within easy reach of the operator.



Due to its chambered construction and the lubricant-sealed plug valve, the fitting may be serviced and the orifice plate changed under line pressure. Location of the orifice disc midway of the fitting simplifies installation, as direction of flow is not a factor.

Commercial Type CS Orifice Fittings are available with either flanged or welding ends. More detailed information may be obtained by writing Commercial Iron Works, 2424 Porter Street, Los Angeles 21, California.

Kennametal Expands

Kennametal, Inc., manufacturer of cemented carbide products, has announced the purchase of a 1,200-acre tract of land near Latrobe, Pa., for the expansion of manufacturing facilities and to permit further decentralization to minimize damage from future floods.

An official stated that the company plans to develop the area at once. A contract for the construction of the first unit will be awarded within a week or so. This installation will provide about 25,000 square feet of floor space and will be utilized for grinding and finishing of special or custom-fabricated carbide products. This unit is expected to be in production by the end of the year.

The decentralization of the firm's manufacturing activities in the Latrobe area was instituted about five years ago with the building of a plant at Bedford, Pa., for manufacturing tools for the mining industry. In 1954 the firm estimated a flood damage of $417,000 to facilities in its main plant in Latrobe. Since then plants have been built or acquired in Detroit, Mich., and Willoughby, Ohio, the latter having been established within the last few months.

Kennametal, Inc., is one of the leading producers of cemented carbide products for the metalworking, mining, woodworking, petroleum, food and chemical processing and other industries.

When the city clerk took a vacation, he left a sign on his door giving complete instructions on where to conduct business:

For registration of births and deaths see Dr. Brown.

For auto and truck licenses, go to Mr. Smith.

For municipal business see Mr. Black.

For marriage licenses—think it over and come back in ten days.

When the girl asked her boy friend, "Would you like to see where I was operated for my appendix?" this silly goof shook his head. "No, I don't like hospitals."

THIS

LAUGH

OFF!!

The girl who stepped out with the big lumber man wound up with a little shaver.

A news report of a ladies' golf tournament described one scene by saying, "A large crowd followed Miss Smith whose shorts were falling on the green with amazing regularity."

"Let me show you something new in a snappy sedan," suggested the salesman.

"It won't do you any good," she replied, "and besides, I don't think you could."

Driller: "I accidentally caught a glimpse of the maid today in her pajamas. Do you know, honey, she's got almost as fine a figure as you have?"

Wife: "That's what the chauffeur tells me."

By the time we get old enough not to care what anybody says about us, nobody says anything.

A sign in the window at 4317 N. Sycamore read: "WANTED: Experienced girl for kitchen work; must work part time in panty."

I love my little sweater girl,
She snuggles when we waltz
And any day I hope to learn
If she is true or false.

A woman bought a $300 suit at Hattie Carnegie's and then was appalled to see what appeared to be her suit at Ohrbach's for $32.50. She rushed right back to Carnegie's and told them about it.

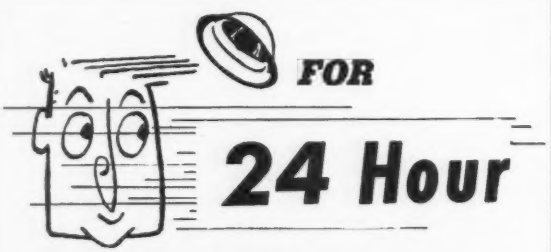
"But, Madam," said the saleswoman, "the Ohrbach copy probably wasn't 100 percent virgin wool."

"At these prices, I don't care what the sheep do at night!" screamed the customer.

The elderly oil man retired early at his hotel to get a good night's sleep. No sooner had his head hit the pillow than there was a knock at the door. Opening it, he was confronted by a beautiful blonde.

"Oh, excuse me," said the young lady, "Ah must have knocked on the wrong doah."

"Not only that," said the old gentleman, "but you knocked 40 years too late."



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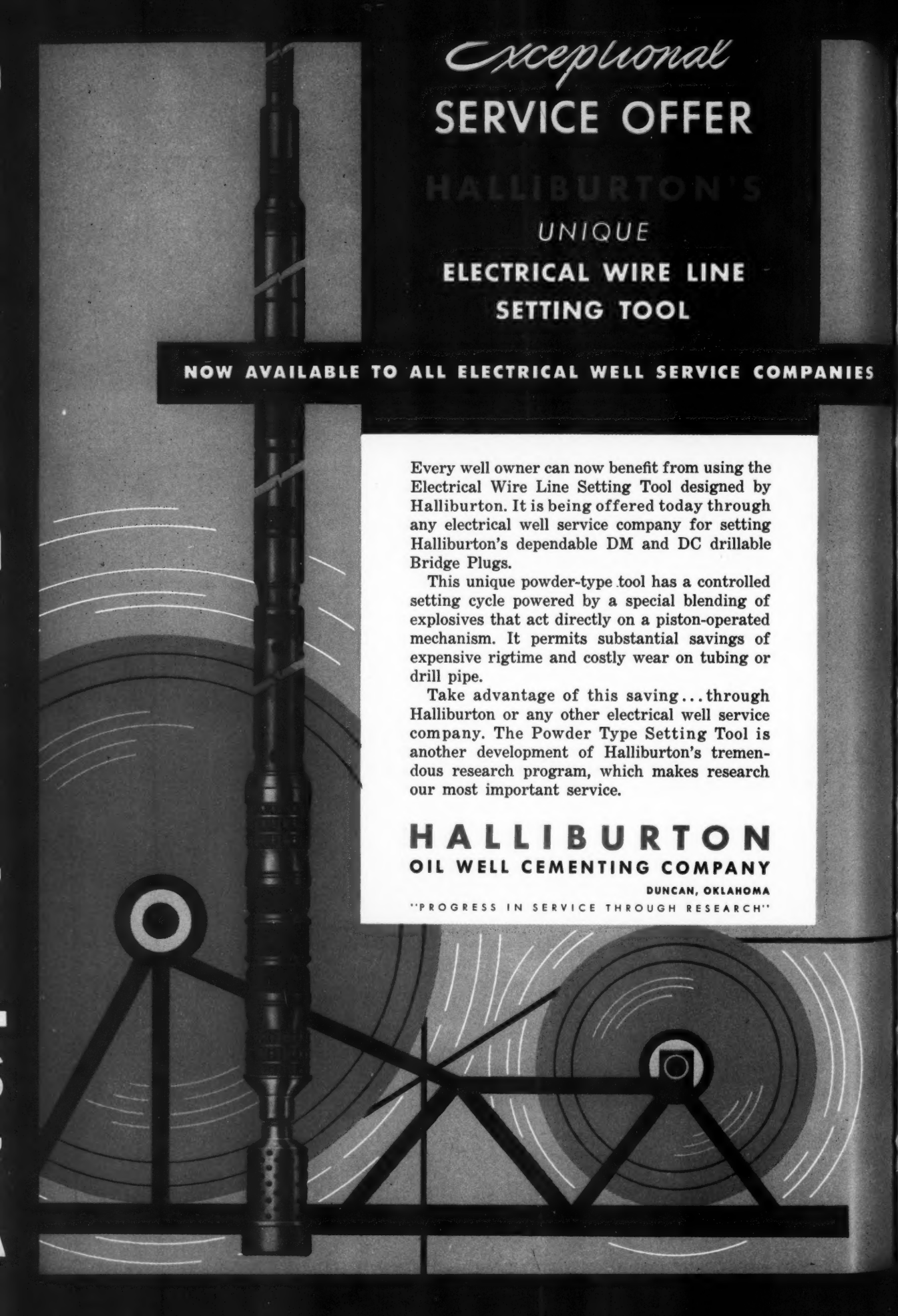

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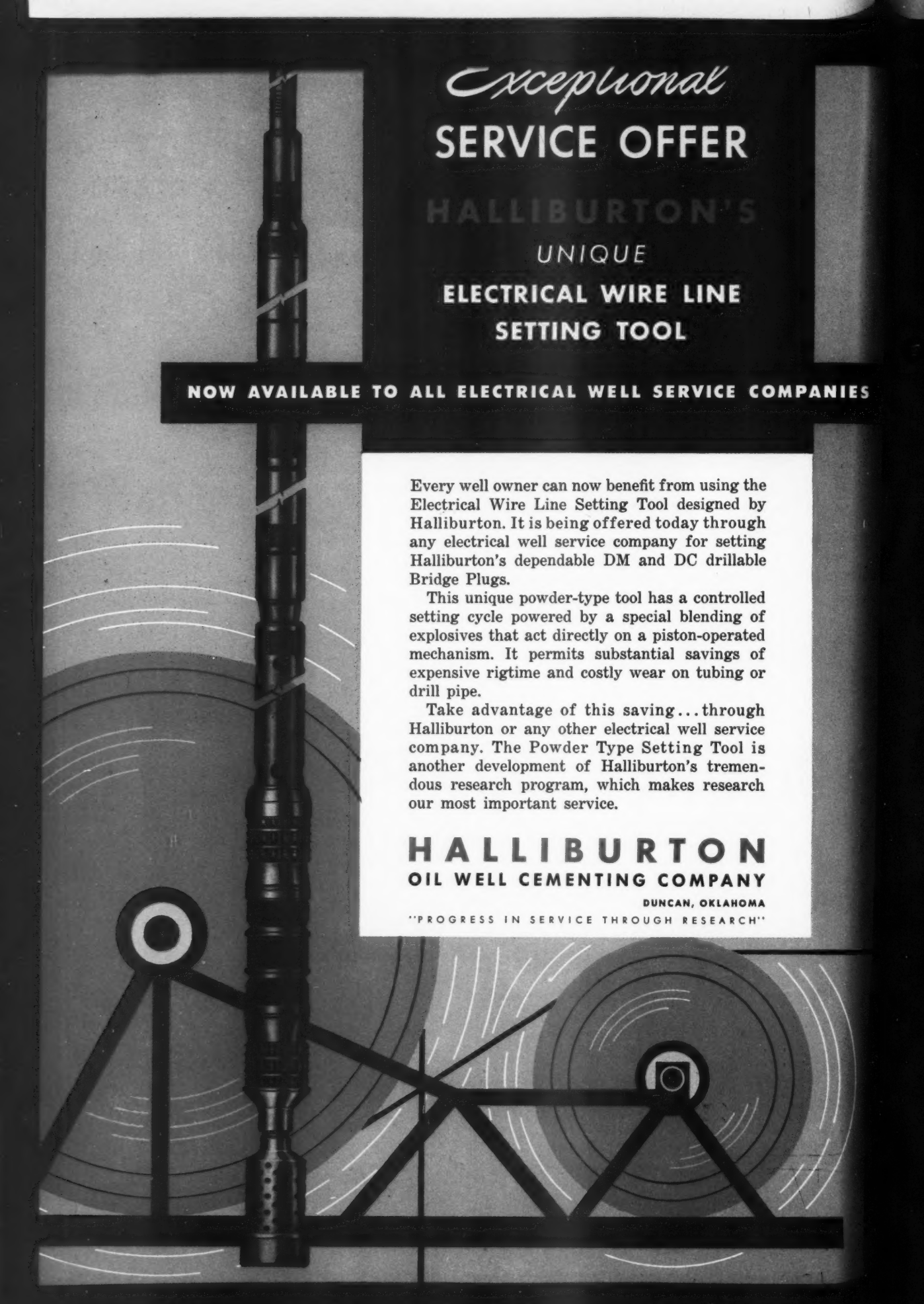
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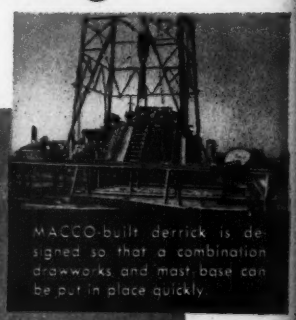
Conventional oil well derrick with a special MACCO-built base provides room for moving in a combination drawworks and mast base *after* the derrick is completely erected. The drawworks and bases can be used elsewhere until needed.

PRACTICAL

No alterations are required either on the derrick or the combination drawworks and mast base . . . conventional piping and attachments are used throughout the rig.

FAST

When the well being drilled nears completion another derrick can be erected at the next drilling site and be ready for the combination drawworks and mast base to be moved in and put to work in a hurry.



MACCO-built derrick is designed so that a combination drawworks and mast base can be put in place quickly.

for full details call **NEVADA 6-1261**

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